



# Search Report

**EIC 1700**

## STIC Database Tracking Number:

To: MICHAEL BERNSHTEYN  
Location: REM-10D25  
Art Unit: 1796  
Thursday, January 17, 2008  
Phone: (571) 272-2411  
Case Serial Number: 10 / 508748

From: JAN DELAVAL  
Location: EIC1700  
REM-4B28 / REM-4A30  
Phone: (571) 272-2504

[jan.delaval@uspto.gov](mailto:jan.delaval@uspto.gov)

## Search Notes

SCIENTIFIC REFERENCE BR  
Sci & Tech Inf. Cntr.

JAN 17 REC'D

Pat. & T.M. Office

*RUSH*

RANDY GULAKOWSKI  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700

Access DB# 248579

## SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: Michael Bernshofen Examiner #: 81515 Date: 01/16/08  
Art Unit: 1796 Phone Number 30 272-2411 Serial Number: 10/508,748  
Mail Box and Bldg/Room Location: Rem 10025 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

\*\*\*\*\*

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Innovative method for the preparation of proton  
Inventors (please provide full names): Giulio Albori; Mario Casciola;  
Monica Pica

Earliest Priority Filing Date: 05/22/2002

\*For Sequence Searches Only\* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.

Please, try to find insoluble compounds according claim 1 with the limitations of claims 2-7 and the phosphate-phosphonates according claim 14, ~~and~~ 16 and 24.

Thank you  
M. Bernshofen

\*\*\*\*\*

**STAFF USE ONLY****Type of Search****Vendors and cost where applicable**Searcher:                     NA Sequence (#)                     STN                     Searcher Phone #:                     AA Sequence (#)                     Dialog                     Searcher Location:                     Structure (#)                     Questel/Orbit                     Date Searcher Picked Up: 1/17/08Bibliographic                     Dr.Link                     Date Completed: 1/17/08Litigation                     Lexis/Nexis                     Searcher Prep & Review Time:                     Fulltext                     Sequence Systems                     Clerical Prep Time: 60Patent Family                     WWW/Internet                     Online Time: +150Other                     Other (specify)                     

PTO-1590 (8-01)

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 DICTIONARY FILE UPDATES: 16 JAN 2008 HIGHEST RN 1000147-48-7

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L13 42510 SEA FILE=REGISTRY ABB=ON PLU=ON P/ELS AND (ZR OR TI OR SN OR  
 CE)/ELS  
 L14 93715 SEA FILE=REGISTRY ABB=ON PLU=ON P/ELS AND (HF OR SI OR PB OR  
 GE)/ELS  
 L15 127168 SEA FILE=REGISTRY ABB=ON PLU=ON (L13 OR L14)  
 L21 STR

4  
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 O-X P-X O  
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NODE ATTRIBUTES:  
 DEFAULT MLEVEL IS ATOM  
 DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:  
 RING(S) ARE ISOLATED OR EMBEDDED  
 NUMBER OF NODES IS 4

STEREO ATTRIBUTES: NONE  
 L23 30304 SEA FILE=REGISTRY SUB=L15 SSS FUL L21

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 SEARCH TIME: 00.00.01

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This file contains CAS Registry Numbers for easy and accurate substance identification.

=> d bib abs hitstr retable tot l142

L142 ANSWER 1 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 2003:778142 HCAPLUS

DN 139:294647

TI An innovative method for the preparation of proton conducting nanopolymeric membranes for use in fuel cells or in catalytic membrane reactors

IN **Alberti, Giulio; Casciola, Mario; Pica, Monica**

PA **Fuma-Tech G.m.b.H., Germany; Fuma-Tech Gesellschaft Fuer Funktionelle Membranen**

SO PCT Int. Appl., 31 pp.

CODEN: PIXXD2

DT **Patent**

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2003081691	A2	20031002	WO 2003-EP2904	20030320 <--
	WO 2003081691	A3	20050623		
	W:				
	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
	RW:				
	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	IT 2002PG0015	A1	20030922	IT 2002-PG15	20020322 <--
	CA 2479314	A1	20031002	CA 2003-2479314	20030320 <--
	AU 2003226671	A1	20031008	AU 2003-226671	20030320 <--
	EP 1563559	A2	20050817	EP 2003-744819	20030320 <--
	R:				
	AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, SK				
	JP 2005527545	T	20050915	JP 2003-579295	20030320 <--
	US 2005164092	A1	20050728	US 2005-508748	20050207 <--
PRAI	IT 2002-PG15	A	20020322		<--

WO 2003-EP2904 W 20030320

AB The invention is based on the preparation of an organic solution of preferably phosphonic acids and tetravalent metals salts, preferably of Zr, Ti, Sn and Ce, in organic solvents, which behaves as a solution of layered tetravalent metals salts, preferably phosphate-phosphonates, which are completely insol. in the known solvents. This peculiarity allows an easy insertion of particles of the above compds. in the pores of porous membranes, in the matrixes of those polymers, which are soluble in the same organic solvents, as well as in the membrane/electrode interfaces of fuel cells. The use of tetravalent metals salts, preferably zirconium phosphate-phosphonates, possessing high proton conductivity (in some cases higher than  $10^{-1}$  S cm $^{-1}$ ) allows the preparation of impregnated porous membranes and of nano-polymeric membranes combining good mech. properties, and/or reduced permeability to gaseous species, with good proton conductivity. These membranes can therefore

be employed in fuel cells even at temps. higher than 80°. These membranes also possess a high catalytic activity and can therefore be employed in catalytic membrane reactors.

IT **116405-42-6P 131249-73-5DP**, solid solution with zirconium phosphate and phosphonate containing organic diacids **608103-65-7DP**, solid solution with zirconium phosphate and phosphonate containing organic diacids

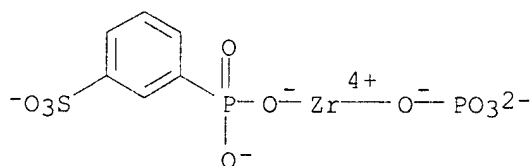
**608103-65-7P**

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(innovative method for preparation of proton conducting nanopolymeric membranes for use in fuel cells or in catalytic membrane reactors)

RN 116405-42-6 HCAPLUS

CN Zirconate(2-), [phosphato(3-)-κO][3-(phosphono-κO)benzenesulfonato(3-)]-, dihydrogen (9CI) (CA INDEX NAME)



● 2 H<sup>+</sup>

RN 131249-73-5 HCAPLUS

CN Benzenesulfonic acid, phosphono-, zirconium(4+) salt (2:1) (9CI) (CA INDEX NAME)



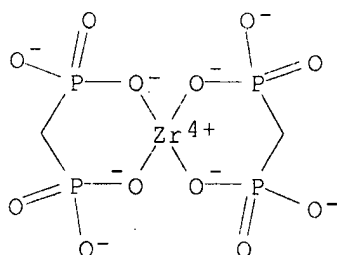
D1-SO<sub>3</sub>H

D1-PO<sub>3</sub>H<sub>2</sub>

● 1/2 Zr(IV)

RN 608103-65-7 HCAPLUS

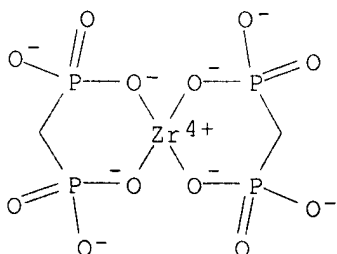
CN Zirconate(4-), bis[[methylenebis[phosphonato-κO]](4-)]-,  
tetrahydrogen, (T-4)- (9CI) (CA INDEX NAME)



● 4 H<sup>+</sup>

RN 608103-65-7 HCAPLUS

CN Zirconate(4-), bis[[methylenebis[phosphonato-κO]](4-)]-,  
tetrahydrogen, (T-4)- (9CI) (CA INDEX NAME)



● 4 H<sup>+</sup>

L142 ANSWER 2 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 2003:738051 HCAPLUS

DN 139:246732

TI Ion conducting composite membrane materials containing an optionally modified zirconium phosphate dispersed in a polymeric matrix, preparation of membrane material, and use

IN Bauer, Bernd; Roziere, Jacques; Jones, Deborah; **Alberti, Giulio;**  
**Casciola, Mario; Pica, Monica**

PA **Fuma-Tech G.m.b.H., Germany**

SO PCT Int. Appl., 31 pp.

CODEN: PIXXD2

DT **Patent**

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2003077340	A2	20030918	WO 2003-EP2550	20030312 <--
	WO 2003077340	A3	20040325		
	W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW			
	RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			
	IT 2002PG0013	A1	20030915	IT 2002-PG13	20020313 <--
	CA 2479000	A1	20030918	CA 2003-2479000	20030312 <--
	AU 2003212342	A1	20030922	AU 2003-212342	20030312 <--
	EP 1481438	A2	20041201	EP 2003-708222	20030312 <--
	R:	AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK			
	JP 2005520291	T	20050707	JP 2003-575441	20030312 <--
	US 2005118480	A1	20050602	US 2005-507432	20050210 <--
	US 7108935	B2	20060919		
PRAI	IT 2002-PG13	A	20020313	<--	
	WO 2003-EP2550	W	20030312		

AB A polymer is uniformly filled with a Zr phosphate, preferably  $\alpha$ -Zr phosphate or Zr phosphate sulfoarylenphosphonate particles. The composite membrane materials are preferably prepared starting from a solution of a polymer and from a colloidal dispersion of  $\alpha$ -Zr phosphate or a Zr phosphate sulfoarylenphosphonate, and by removing the solvent by evaporation or by a suitable nonsolvent. The colloidal particles are transferred into the solution of the polymer preferably by mixing the dispersion with the solution or by phase transfer. The ionomeric membranes with high overall performance in high temperature, especially H, are used in indirect MeOH fuel cells

and with decreased MeOH crossover in direct MeOH fuel cells.

IT **127833-97-0D**, solid solns. with zirconium phosphate

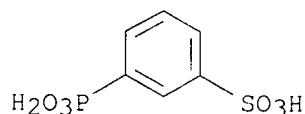
RL: TEM (Technical or engineered material use); USES (Uses)

(ion conducting composite membrane materials containing an optionally modified zirconium phosphate dispersed in a polymeric matrix)

RN 127833-97-0 HCAPLUS

CN Benzenesulfonic acid, 3-phosphono-, zirconium(4+) salt (2:1) (CA INDEX NAME)





● 1/2 Zr(IV)

L142 ANSWER 3 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 2002:765501 HCAPLUS

DN 138:79081

TI Highly Porous Zirconium Aryldiphosphonates and Their Conversion to Strong Bronsted Acids

AU Clearfield, Abraham; Wang, Zhike; Bellinghausen, Paul

CS Department of Chemistry, Texas A&M University, College Station, TX, 77842-3012, USA

SO Journal of Solid State Chemistry (2002), 167(2), 376-385

CODEN: JSSCBI; ISSN: 0022-4596

PB Elsevier Science

DT Journal

LA English

AB Porous inorg.-organic hybrids have been prepared by the reaction of 4,4'-biphenylbis(phosphonic acid) with Zr(IV) in organic solvents. The resultant products consist of  $\alpha$ -zirconium phosphate-type layers crosslinked by biphenyl pillars. By using an excess of Zr in the synthesis, surface areas of .apprx.400 m<sup>2</sup>/g have been obtained and the pores can be controlled to be the micro-type with diams. of 10-20 Å and a relatively narrow pore size distribution. The aromatic rings are readily sulfonated by SO<sub>3</sub> under pressure to produce very strong Bronsted acid catalysts. An NMR procedure, utilizing the shift of the carbonyl carbon of acetone-2-13C sorbed onto the sulfonated products, indicated an acid strength for the Bronsted acid sites equal to that of 100% sulfuric acid. Unpillared Zr(O<sub>3</sub>PC<sub>6</sub>H<sub>4</sub>SO<sub>3</sub>H)<sub>2</sub> has a somewhat lower acid strength, but still has a higher acid strength than zeolites HX and HY. The particles of this layered acid exfoliate in water and light-scattering data show that they are in 5 nm size range. They also exhibit high proton conductivity

as solid membranes. These sulfonated materials have a potential as strong acid catalysts for a variety of reactions at a low temperature

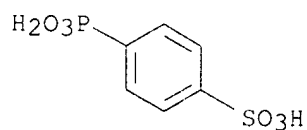
IT 149350-19-6P

RL: SPN (Synthetic preparation); PREP (Preparation)

(highly porous zirconium aryldiphosphonates and their conversion to strong Bronsted acids for catalysts)

RN 149350-19-6 HCAPLUS

CN Benzenesulfonic acid, 4-phosphono-, zirconium(4+) salt (2:1) (CA INDEX NAME)



● 1/2 Zr(IV)

## RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Alberti, G	1978	11	163	Acc Chem Res	HCAPLUS
Alberti, G	1978	40	1113	J Inorg Nucl Chem	HCAPLUS
Alberti, G	1998	5	221	J Porous Mater	HCAPLUS
Alberti, G	1991	233	101	Mater Research Socie	HCAPLUS
Anon	1988	2	185	Catalysis Today	
Anon	1982			Inorganic Ion Exchan	
Clearfield, A	1996		345	Advanced Catalysts a	HCAPLUS
Clearfield, A	1984	14	205	Ann Rev Mater Sci	HCAPLUS
Clearfield, A	1998	10	2801	Chem Mater	HCAPLUS
Clearfield, A	1986		128	Design of New Materi	
Clearfield, A	1964	26	117	J Inorg Nucl Chem	HCAPLUS
Clearfield, A	1998		371	Progress in Inorgani	HCAPLUS
Corma, A	1997	97	2373	Chem Rev	HCAPLUS
Davis, M	1993	26	111	Acc Chem Res	HCAPLUS
Dines, M	1982			ACS Symposium Series	
Gil, A	2000	42	45	Catal Rev Sci Eng	
Haw, J	1994	29	259	Acc Chem Res	
Kresge, C	1992	359	710	Nature	HCAPLUS
Paul Belinghausen, M	1995			Thesis Texas A&M Uni	
Poojary, M	1993	49	996	Acta Crystallogr B	
Stein, E	1996	83	113	Solid State Ionics	
Tomlinson, A	1998	5	259	J Porous Mater	HCAPLUS
Troup, J	1977	16	3311	Inorg Chem	HCAPLUS
Wang, Z				manuscript in prepar	
Xu, T	1994	116	1962	J Am Chem Soc	HCAPLUS
Yang, C	1987	5	13	Reactive Polym	HCAPLUS

L142 ANSWER 4 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 2002:364134 HCAPLUS

DN 136:343393

TI Membrane-electrode assembly for polymeric membrane fuel cells

IN **Alberti, Giulio; Casciola, Mario; Ramunni, Enrico;**

Ornelas, Jacobo Ruben

PA Nuvera Fuel Cells Europe S.R.L., Italy; De Nora Elettrodi S.P.A.

SO Eur. Pat. Appl., 8 pp.

CODEN: EPXXDW

DT **Patent**

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1205994	A2	20020515	EP 2001-126954	20011113 <--
	EP 1205994	A3	20020918		
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IE, SI, LT, LV, FI, RO, MK, CY, AL, TR

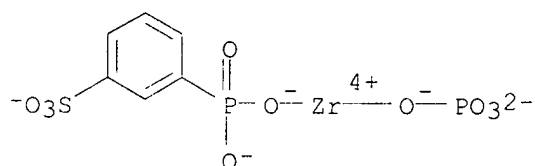
IT 2000MI2443	A1	20020514	IT 2000-MI2443	20001114 <--
IT 1319649	B1	20031023		
US 2002058173	A1	20020516	US 2001-11458	20011022 <--
US 7144652	B2	20061205		
CA 2359959	A1	20020514	CA 2001-2359959	20011025 <--
JP 2002203575	A	20020719	JP 2001-348296	20011114 <--
JP 2007200906	A	20070809	JP 2007-79438	20070326 <--
PRAI IT 2000-MI2443	A	20001114	<--	
JP 2001-348296	A3	20011114	<--	

AB The invention is relative to a membrane-electrode assembly for fuel cells, comprising a state of the art ion-exchange polymeric membrane and by state of the art gas diffusion electrodes, whose electrochem. properties are modified through the addition of a hydrophilic component localized in correspondence of one or both the electrodic interfaces and/or one or both the external surfaces of the membrane. The such modified membrane-electrode assembly is characterized by high protonic conductivity and high efficiency even in the presence of small quantities of carbon monoxide, or of other contaminants contained in the fuel, even at temps. as low as 100°, being also suitable for medium temperature (100-160°) operation at relative humidity level lower than saturation

IT **116405-42-6**  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (membrane-electrode assembly for polymeric membrane fuel cells)

RN 116405-42-6 HCAPLUS

CN Zirconate(2-), [phosphato(3-)-κO][3-(phosphono-κO)benzenesulfonato(3-)]-, dihydrogen (9CI) (CA INDEX NAME)



● 2 H<sup>+</sup>

L142 ANSWER 5 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 2001:830180 HCAPLUS

DN 136:247181

TI Zirconium sulfophenyl phosphonate as a heterogeneous catalyst in the preparation of β-amino alcohols from epoxides

AU Curini, Massimo; Epifano, Francesco; Marcotullio, Maria Carla; Rosati, Ornelio

CS Dipartimento di Chimica e Tecnologia del Farmaco, Facolta di Farmacia, Universita degli Studi, Perugia, 06123, Italy

SO European Journal of Organic Chemistry (2001), (21), 4149-4152  
 CODEN: EJOCFK; ISSN: 1434-193X

PB Wiley-VCH Verlag GmbH

DT Journal

LA English

OS CASREACT 136:247181

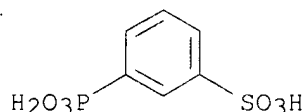
AB Cyclic and acyclic β-amino alcs. are prepared in 17-94% yields by the addition of aromatic amines to epoxides in the presence of zirconium sulfophenyl

phosphonate under solvent-free conditions. E.g., cyclohexene oxide and 2-methoxyaniline were stirred in the presence of zirconium sulfophenyl phosphonate at room temperature for 22 h to give trans-2-(2-methoxyphenylamino)-1-cyclohexanol in 90% yield. Cyclic amino alcs. were prepared stereoselectively as the trans-isomers. Acyclic amino alcs. were prepared as mixts. of regioisomers generally favoring ring opening at the least substituted carbon, with the exception of styrene oxide, which undergoes ring opening primarily at the benzylic carbon.

IT 127833-97-0D, solid solution with zirconium methylphosphonate  
 RL: CAT (Catalyst use); USES (Uses)  
 (preparation of cyclic and acyclic  $\beta$ -amino alcs. by ring opening of epoxides with aromatic amines under solvent-free conditions in the presence of zirconium sulfophenyl phosphonate)

RN 127833-97-0 HCAPLUS

CN Benzenesulfonic acid, 3-phosphono-, zirconium(4+) salt (2:1) (CA INDEX NAME)



● 1/2 Zr(IV)

# RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Alcaide, B	1983		1649	J Chem Soc, Perkin T	HCAPLUS
Barluenga, J	1981		376	Synthesis	HCAPLUS
Bergmeier, S	2000	56	2561	Tetrahedron	HCAPLUS
Chng, B	1997	7	1511	Bioorg Med Chem Lett	HCAPLUS
Crooks, P	1973		1111	Chem Ind (London)	HCAPLUS
Curini, M	1996		333	Synlett	HCAPLUS
Curini, M	1997		769	Synlett	HCAPLUS
Curini, M	1999		541	Synthetic Comm	HCAPLUS
Curini, M	1998	39	8159	Tetrahedron Lett	HCAPLUS
Deyrup, J	1969	34	175	J Org Chem	HCAPLUS
Hodgson, D	1996	25	14361	Tetrahedron	
Kobalka, G	1997	53	7999	Tetrahedron	
Lindstrom, U	1999	40	9273	Tetrahedron Lett	HCAPLUS
Mojtadei, M	1999		128	J Chem Res (S)	
Rampalli, S	2000	1	78	Synthesis	
Reddy, L	2000	3	339	Synlett	
Rogers, G	1989	32	1217	J Med Chem	HCAPLUS
Sekar, G	1999	64	287	J Org Chem	HCAPLUS

L142 ANSWER 6 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 2001:777699 HCAPLUS

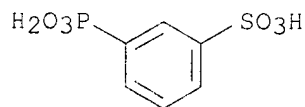
DN 136:111613

TI Preparation, characterization and proton conductivity of titanium phosphate sulfophenylphosphonate

AU Alberti, G.; Costantino, U.; Casciola, M.; Ferroni, S.; Massinelli, L.; Staiti, P.

CS Department of Chemistry, University of Perugia, Perugia, 06123, Italy

SO Solid State Ionics (2001), 145(1-4), 249-255  
 CODEN: SSIOD3; ISSN: 0167-2738  
 PB Elsevier Science B.V.  
 DT Journal  
 LA English  
 AB Titanium phosphate sulfophenylphosphonate,  $\text{Ti}(\text{HPO}_4)\text{1.00}(\text{O}_3\text{PC}_6\text{H}_4\text{SO}_3\text{H})\text{0.85}(\text{O})\text{0.30}\cdot\text{nH}_2\text{O}$  was synthesized and characterized by x-ray diffraction, solid state NMR, impedance measurements, TG and DSC anal. The MAS NMR spectrum of  $^{31}\text{P}$  nucleus presents two resonances characteristic of monohydrogen phosphate and sulfophenylphosphonate groups coordinated to three  $\text{Ti}(\text{IV})$  atoms through three nonprotonated oxygen atoms. Water content; protonic conductivity ( $\sigma$ ) and activation energy for conduction ( $E_a$ ) were determined in the range 20 to  $-20^\circ$  for materials equilibrated at relative humidity (r.h.) in the range 5-90%. By increasing the number of water mols. per sulfonic group from 2 to 14,  $\sigma$  rises by 3 orders of magnitude up to .apprx.0.1 S  $\text{cm}^{-1}$ , while  $E_a$  decreases from 12.6 to 4.3 kcal/mol. Measurements were also carried out at  $100^\circ$  as a function of relative humidity in the range 30-100%;  $\sigma$  values  $>0.1$  S  $\text{cm}^{-1}$  were found at r.h. 65%. The titanium phosphonate was used as a filler of Nafion 1100 hybrid membranes. At  $100^\circ$  and 80% r.h., the conductivity of the hybrid membranes containing from 5% to 20% phosphonate loading is very similar to that of a Nafion 1100 membrane prepared inhouse by casting technique, but it drops by an order of magnitude when the loading is increased to 30%.  
 IT 175694-12-9DP, solid solution with titanium phosphate and hydroxide  
 RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
 (preparation and proton conductivity with and without loading in Nafion 1100 hybrid membranes)  
 RN 175694-12-9 HCAPLUS  
 CN Benzenesulfonic acid, 3-phosphono-, titanium(4+) salt (2:1), hydrate (9CI)  
 (CA INDEX NAME)



● x  $\text{H}_2\text{O}$

● 1/2  $\text{Ti}(\text{IV})$

## RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Alberti, G	1996	18	291	Adv Mater	HCAPLUS
Alberti, G	1967	29	571	J Inorg Nucl Chem	HCAPLUS
Alberti, G	2001	185	73	J Membr Sci	HCAPLUS
Alberti, G	1992	50	315	Solid State Ionics	HCAPLUS
Alberti, G	1996	84	97	Solid State Ionics	HCAPLUS
Alberti, G	1997	97	177	Solid State Ionics	HCAPLUS
Antonucci, P	1999	125	431	Solid State Ionics	HCAPLUS

Appleby, A	1989	326	Fuel Cell Handbook
Bauer, B	2000  3	93	J New Mater Electrochem HCAPLUS
Bonnet, B	2000  3	87	J New Mater Electrochem HCAPLUS
Cavach, C	1992	487	Proton Conductors
Clayden, N	1987	1877	J Chem Soc, Dalton Trans HCAPLUS
Huggins, R	1975	445	Diffusion in Solids, HCAPLUS
Iwahara, H	1992	511	Proton Conductors
Kjaer, J	1991  46	169	Solid State Ionics HCAPLUS
Miura, N	1992	527	Proton Conductors
Oetjen, H	1996  143	3838	J Electrochem Soc HCAPLUS
Staiti, P	1999  79-2	250	J Power Sources
Stein, E	1996  83	113	Solid State Ionics

L142 ANSWER 7 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 2001:508670 HCAPLUS

DN 135:257222

TI An efficient procedure for the preparation of cyclic ketals and thioketals catalyzed by zirconium sulfophenyl phosphonate

AU Curini, Massimo; Epifano, Francesco; Marcotullio, Maria Carla; Rosati, Ornelio

CS Dipartimento di Chimica e Tecnologia del Farmaco - Sezione di Chimica Organica, Facolta di Farmacia, Universita di Perugia, Perugia, I-06123, Italy

SO Synlett (2001), (7), 1182-1184

CODEN: SYNLES; ISSN: 0936-5214

PB Georg Thieme Verlag

DT Journal

LA English

OS CASREACT 135:257222

AB A convenient method for the preparation of cyclic ketals and thioketals using zirconium sulfophenyl phosphonate as catalyst is described.

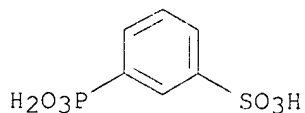
IT 127833-97-0D, solid solution with zirconium methylphosphonate

RL: CAT (Catalyst use); USES (Uses)

(efficient procedure for preparation of cyclic ketals and thioketals catalyzed by zirconium sulfophenyl phosphonate)

RN 127833-97-0 HCAPLUS

CN Benzenesulfonic acid, 3-phosphono-, zirconium(4+) salt (2:1) (CA INDEX NAME)



● 1/2 Zr(IV)

## RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Alberti, G	1992	50	315	Solid State Ionics	HCAPLUS
Ballantine, J	1983	18	347	Clays Minerals	HCAPLUS
Chopade, S	1999	42	201	React Funct Polym	HCAPLUS
Climent, M	2000	196	345	J Catal	HCAPLUS
Corma, A	1995	95	559	Chem Rev	HCAPLUS
Cornelis, A	1982		162	Synthesis	HCAPLUS

Cramarossa, M	1997	46	15889	Tetrahedron	
Curini, M	1996		333	Synlett	HCAPLUS
Curini, M	1997		760	Synlett	
Curini, M	1999	29	541	Synth Commun	HCAPLUS
Curini, M	2000	30	1319	Synth Commun	HCAPLUS
Curini, M	1998	39	8159	Tetrahedron Lett	HCAPLUS
Greene, T	1991			Protective Groups in	
Hattori, H	1995	95	537	Chem Rev	HCAPLUS
Labiad, B	1989	19	31	Synth Commun	HCAPLUS
Li, T	1997		26	J Chem Res, Synop	HCAPLUS
Otha, G	1981		282	Synthesis	
Ponde, D	1996	26	4605	Tetrahedron Lett	
Sabde, D	1996		494	J Chem Res, Synop	HCAPLUS
Seebach, D	1974		687	Chem Ind	
Tateiwa, J	1995	60	4039	J Org Chem	HCAPLUS
Taylor, E	1977		467	Synthesis	HCAPLUS

L142 ANSWER 8 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 2000:383054 HCAPLUS

DN 133:61256

TI Hybrid organic-inorganic membranes for a medium temperature fuel cell

AU Bonnet, B.; Jones, D. J.; Roziere, J.; Tchicaya, L.; **Alberti, G.**  
; **Casciola, M.**; Massinelli, L.; Bauer, B.; Peraio, A.; Ramunni,  
E.

CS Laboratoire des Agregats Moleculaires et Materiaux Inorganiques, UMR CNRS  
5072, Universite Montpellier II, Montpellier, 34095, Fr.

SO Journal of New Materials for Electrochemical Systems (2000),  
3(2), 87-92

CODEN: JMESFQ; ISSN: 1480-2422

PB Journal of New Materials for Electrochemical Systems

DT Journal

LA English

AB Sulfonated poly(ether-ether-ketone) (PEEK-S) has been used as a polymer  
matrix for hybrid membrane formation with inorg. proton conductors.  
Membranes incorporating up to 40% weight/weight of inorg. proton conductor,  
including amorphous silica, zirconium phosphate sulfophenylphosphonate,  
and zirconium phosphate, have been prepared The membranes have been  
characterized using powder x-ray diffraction and MAS NMR spectroscopy  
where appropriate, and conductivity measurements were performed as a function

of relative humidity (RH) at 100° and as a function of temperature at 100%  
RH. In all cases, the presence of the inorg. particles leads to an  
increase in conductivity of the polymer membrane and is without detriment to

its flexibility. For example, PEEK-S-based membranes containing 10% amorphous  
silica, 30% zirconium phosphate, or 40% amorphous zirconium phosphate  
sulfophenylphosphonate present conductivities in the range 0.03-0.09 S/cm  
at 100°/100% RH. Polarization characteristics for PEEK-S membranes  
containing 25 and 13% weight/weight of zirconium phosphate under conditions of  
hydrogen/oxygen and hydrogen/air, resp., are reported, up to 120°.

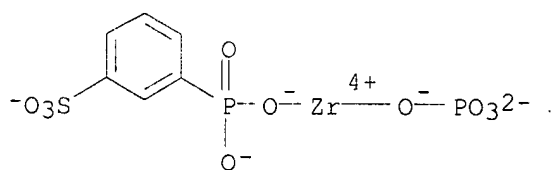
IT 116405-42-6

RL: DEV (Device component use); PRP (Properties); TEM (Technical or  
engineered material use); USES (Uses)

(in hybrid organic-inorg. membranes for a medium-temperature fuel cell)

RN 116405-42-6 HCAPLUS

CN Zirconate(2-), [phosphato(3-)-κO][3-(phosphono-  
κO)benzenesulfonato(3-)]-, dihydrogen (9CI) (CA INDEX NAME)



● 2 H<sup>+</sup>

## RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Alberti, G	1996	18	1291	Adv Mater	HCAPLUS
Alberti, G	1995	15	1809	J Mater Chem	HCAPLUS
Alberti, G	1992	150	1315	Solid State Ionics	HCAPLUS
Alberti, G	1992	158	1335	Solid State Ionics	
Alberti, G	1997	197	1177	Solid State Ionics	HCAPLUS
Antonucci, P	1998		1187	19th International Col	
Bauer, B	2000	13	193	J New Mat Electroche	HCAPLUS
Hubner, G	1999	19	1409	J Mater Chem	HCAPLUS
Jones, D	1996	1-2	1115	Envr Res Forum	HCAPLUS
Kjaer, J	1991	146	1169	Solid State Ionics	HCAPLUS

L142 ANSWER 9 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1999:577906 HCAPLUS

DN 131:311884

TI Studies on preparation, characterization and catalytic properties of zirconium phenylphosphonate phosphite and its sulfonated derivatives

AU Yi, Jianjun; Li, Feng; Du, Yibo; Evans, D. G.; Duan, Xue

CS Department of Applied Chemistry, Beijing University of Chemical Technology, Beijing, 100029, Peop. Rep. China

SO Shiyou Xuebao, Shiyou Jiagong (1999), 15(3), 83-88

CODEN: SXSHEY; ISSN: 1001-8719

PB Zhongguo Shihua Chubanshe

DT Journal

LA Chinese

AB Zr(C6H5PO3)2 (ZrPP), Zr(C6H5PO3)2-x(HPO3)x·nH2O (Pi-ZrPP) and Zr(HSO3C6H4PO3)2-x(HPO4)x·nH2O (ZrSP) were prepared by HF complexation method, refluxing method, and sulfonation. As determined by x-ray powder diffraction, they are all typical crystalline layered solids, with interlayer spacings (d) of 1.51 nm or 1.06 nm for Pi-ZrPP, depending on the reaction conditions, 1.61 nm for ZrSP. The structural characters of Pi-ZrPP and ZrSP were studied by IR, elemental anal. and TG. The catalytic properties of Pi-ZrPP and ZrSP have also been studied through the reaction of ethanol and propylene oxide in an attempt to obtain a narrow-range distribution of alc. ether oligomers.

IT 131249-73-5DP, reaction products with zirconium phosphate  
RL: CAT (Catalyst use); IMF (Industrial manufacture); PRP (Properties); PREP (Preparation); USES (Uses)  
(preparation, characterization and catalytic properties of zirconium phenylphosphonate phosphite and sulfonated derivs. for reaction of ethanol with propylene oxide)

RN 131249-73-5 HCAPLUS

CN Benzenesulfonic acid, phosphono-, zirconium(4+) salt (2:1) (9CI) (CA INDEX NAME)





D1-SO<sub>3</sub>H

D1-PO<sub>3</sub>H<sub>2</sub>

● 1/2 Zr(IV)

L142 ANSWER 10 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1999:181859 HCAPLUS

DN 130:302218

TI Two-dimensional composite zirconium phosphonates: preparation and catalytic activities

AU Segawa, Kohichi; Ozawa, Takako

CS Department of Chemistry, Sophia University, Tokyo, 102-8554, Japan

SO Journal of Molecular Catalysis A: Chemical (1999), 141(1-3), 249-255

CODEN: JMCCF2; ISSN: 1381-1169

PB Elsevier Science B.V.

DT Journal

LA English

AB Composite zirconium phosphonates in single crystal phase have been investigated and characterized by XRD, <sup>13</sup>C-, and <sup>31</sup>P-MASNMR. These compds. are lamellar structures comprising zirconium organophosphonates. Each layer consists of planes of zirconium bridged through phosphonate groups that alternate above and below the Zr atom planes, oriented away from the basal surfaces in a bilayered fashion in the interlayer region. The catalytic performance over zirconium phosphonates is evaluated by esterification of acetic acid. When the composite zirconium phosphonate includes an acidic function and with a hydrophobic function in single crystal phase, the catalytic activity showed a higher activity than that of sulfonic acid catalyst. The composite zirconium phosphonates become accessible to any reactant mol. and improve hydrophobicity around acidic sites.

IT 137506-48-0P

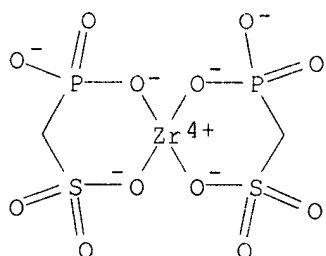
RL: CAT (Catalyst use); PRP (Properties); SPN (Synthetic preparation);

PREP (Preparation); USES (Uses)

(two-dimensional composite zirconium phosphonate preparation and catalytic activity)

RN 137506-48-0 HCAPLUS

CN Zirconate(2-), bis[(phosphono-κO)methanesulfonato(3-)-κO]-, dihydrogen, (T-4)- (9CI) (CA INDEX NAME)



● 2 H<sup>+</sup>

## RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Alberti, G	1978	40	1113	J Inorg Nucl Chem	HCAPLUS
Dines, M	1981	20	92	Inorg Chem	HCAPLUS
Segawa, K	1985	94	491	J Catal	HCAPLUS
Segawa, K	1986	101	81	J Catal	HCAPLUS
Segawa, K	1992	74	213	J Mol Catal	HCAPLUS
Segawa, K	1993		255	Proceedings of the 9	HCAPLUS
Segawa, K	1991	60	73	Studies Surf Sci Cat	HCAPLUS
Troup, J	1977	16	3311	Inorg Chem	HCAPLUS
Whittingham, M	1982			Intercalation Chemis	
Yamanaka, S	1979	41	45	J Inorg Nucl Chem	HCAPLUS

L142 ANSWER 11 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1999:131623 HCAPLUS

DN 130:252415

TI Heterogeneous catalysis in trimethylsilylation of alcohols and phenols by zirconium sulfophenyl phosphonate

AU Curini, Massimo; Epifano, Francesco; Marcotullio, Maria Carla; Rosati, Ornelio; Costantino, Umberto

CS Istituto di Chimica Organica, Facolta di Farmacia, Universita degli Studi, Perugia, I-06123, Italy

SO Synthetic Communications (1999), 29(3), 541-546  
CODEN: SYNCAV; ISSN: 0039-7911

PB Marcel Dekker, Inc.

DT Journal

LA English

OS CASREACT 130:252415

AB Layered Zr sulfophenyl phosphonate is an efficient heterogeneous catalyst for the trimethylsilylation of alcs. and phenols. E.g., o-HOC6H4CH2OH GAVE 86% o-Me3SiOC6H4CH2OSiMe3, o-HOC6H4Bz gave 95% o-Me3SiOC6H4Bz and cyclohexanol gave 95% trimethylsiloxy cyclohexane.

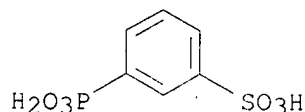
IT 127833-97-0

RL: CAT (Catalyst use); USES (Uses)

(heterogeneous catalysis in trimethylsilylation of alcs. and phenols by zirconium sulfophenyl phosphonate)

RN 127833-97-0 HCAPLUS

CN Benzenesulfonic acid, 3-phosphono-, zirconium(4+) salt (2:1) (CA INDEX NAME)



● 1/2 Zr(IV)

## RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Bruynes, A	1982		3966	J Org Chem	
Curini, M	1996		333	Synlett	HCAPLUS
Curini, M	1997		769	Synlett	HCAPLUS
Dorfuer, K	1972		49	Ion exchangers. Prop	
Greene, T	1991		68	Protective Groups in	
Uppadhyay, T	1996	126	4539	Synth Commun	

L142 ANSWER 12 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1998:700149 HCAPLUS

DN 130:52138

TI Zirconium sulfophenyl phosphonate as a heterogeneous catalyst in tetrahydropyranylation of alcohols and phenols

AU Curini, Massimo; Epifano, Francesco; Marcotullio, Maria Carla; Rosati, Ornelio; Costantino, Umberto

CS Istituto di Chimica Organica, Facolta di Farmacia, Universita degli Studi, Perugia, 06123, Italy

SO Tetrahedron Letters (1998), 39(44), 8159-8162

CODEN: TELEAY; ISSN: 0040-4039

PB Elsevier Science Ltd.

DT Journal

LA English

OS CASREACT 130:52138

AB Zirconium Sulfophenyl Phosphonate Zr(O3PCH3)1.2(O3PC6H4SO3H)0.8 was found to be an efficient heterogeneous catalyst for the tetrahydropyranylation of alcs. and phenols.

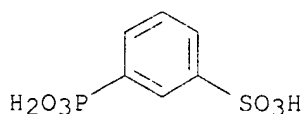
IT 127833-97-0D, solid solns. with zirconium(IV) methylphosphonate

RL: CAT (Catalyst use); USES (Uses)

(zirconium sulfophenyl phosphonate as heterogeneous catalyst in tetrahydropyranylation of alcs. and phenols)

RN 127833-97-0 HCAPLUS

CN Benzenesulfonic acid, 3-phosphono-, zirconium(4+) salt (2:1) (CA INDEX NAME)



● 1/2 Zr(IV)

## RETABLE

Referenced Author	Year	VOL	PG	Referenced Work	Referenced
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(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File
Alberti, G	1996	8	291	Adv Mater	HCAPLUS
Alberti, G	1992	50	315	Solid State Ionics	HCAPLUS
Ballini, R	1997	38	41	Tetrahedron Lett	
Baugdar, B	1995	25	2211	Synth Commun	
Chakrabarti, A	1993	20	1	React Polym	HCAPLUS
Clearfield, A	1998	47	371	Progress in Inorgani	HCAPLUS
Corma, A	1995	95	559	Chem Rev	HCAPLUS
Cornelis, A	1994		155	Synlett	HCAPLUS
Curini, M	1996		333	Synlett	HCAPLUS
Curini, M	1997		769	Synlett	HCAPLUS
Curini, M				Synth Commun accepte	
Hattori, H	1995	195	537	Chem Rev	
Hoyer, S	1986		655	Synthesis	HCAPLUS
Izumi, Y	1992			Clays and Heteropoly	
Kumar, P	1993		1069	Synthesis	HCAPLUS
Ronn, B	1994	59	8269	J Org Chem	
Upadhyay, T	1996	26	4539	Synth Commun	HCAPLUS

L142 ANSWER 13 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1998:577465 HCAPLUS

DN 129:253884

TI Mechanism of the Topotactic Formation of  $\gamma$ -Zirconium Phosphate  
Covalently Pillared with Diphosphonate Groups

AU **Alberti, G.**; Giontella, E.; Murcia-Mascaros, S.; Vivani, R.

CS Department of Chemistry, University of Perugia, Perugia, 06123, Italy

SO Inorganic Chemistry (1998), 37(18), 4672-4676

CODEN: INOCAJ; ISSN: 0020-1669

PB American Chemical Society

DT Journal

LA English

AB The topotactic reaction of  $\gamma$ -ZrPO<sub>4</sub>[O<sub>2</sub>P(OH)<sub>2</sub>] $\cdot$ 2H<sub>2</sub>O  
( $\gamma$ -ZrP) with benzenediphosphonic acid was examined in water and in  
acetone-water mixts. This reaction was found to take place in water only  
on the external surface of the microcrystals, and pillared compds. were  
never obtained, even after very long reaction times. On the contrary,  
covalently pillared compds. were quickly obtained in acetone-water mixts..  
The mechanism of the latter topotactic reaction was investigated by determining  
the rate of the phosphate groups released and the rate of the  
benzenediphosphonates taken up by  $\gamma$ -ZrP over a long time (50 days).  
Pillared derivs. of  $\gamma$ -ZrP can be obtained because colloidal  
dispersions of exfoliated lamellae are formed in acetone-water mixts. The  
diphosphonate group acts initially as a monovalent species, replacing only  
one dihydrogen phosphate group on the surface of the exfoliated  
 $\gamma$ -lamellae. The colloidal and partially derivatized lamellae thus  
formed can interact with each other by forming polylamellar pillared  
systems. When the number of pillared lamellae exceeds a given value (usually  
5-6), flocculation of the colloidal  $\gamma$ -ZrP takes place. Topotactic  
reactions between packets of pillared lamellae may also continue in the  
flocculated system. Therefore, the average number of the pillared lamellae  
slowly increases over time.

IT 149665-40-7DP, solid solution with phosphate salt

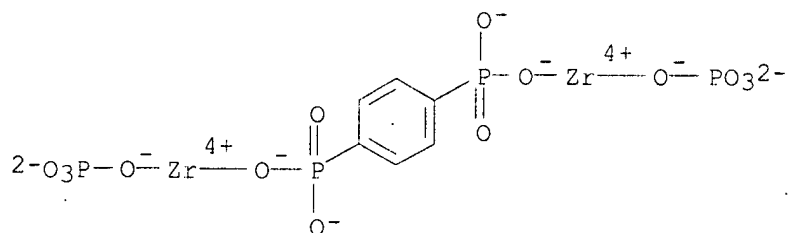
213115-09-4DP, solid solution with phosphate salt

RL: SPN (Synthetic preparation); PREP (Preparation)

(preparation of  $\gamma$ -zirconium phosphate covalently pillared with  
diphosphonate groups)

RN 149665-40-7 HCAPLUS

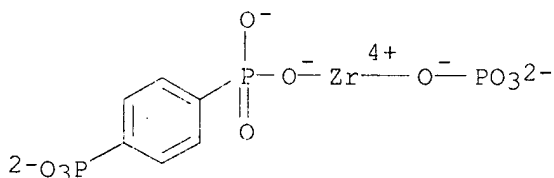
CN Zirconate(2-), [ $\mu$ -[[1,4-phenylenebis[phosphonato- $\kappa$ O]](4-  
))]bis[phosphato(3-)- $\kappa$ O]di-, dihydrogen (9CI) (CA INDEX NAME)



● 2 H<sup>+</sup>

RN 213115-09-4 HCAPLUS

CN Zirconate(3-), [phosphato(3-)-κO] [(4-phosphonophenyl)phosphonato(4-)-κO]-, trihydrogen (9CI) (CA INDEX NAME)



● 3 H<sup>+</sup>

# RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Alberti, G	1993	105	1396	Angew Chem	HCAPLUS
Alberti, G	1993	32	1357	Angew Chem, Int Ed E	
Alberti, G	1994	33	1594	Angew Chem, Int Ed E	
Alberti, G	1993	32	14600	Inorg Chem	HCAPLUS
Alberti, G	1997	36	2845	Inorg Chem	
Alberti, G	1992	201	207	Inorg Chim Acta	HCAPLUS
Alberti, G	1993	157	513	J Coll Interface Sci	HCAPLUS
Alberti, G	1997	188	27	J Colloid Interface	HCAPLUS
Alberti, G				J Mol Struct, in pre	
Alberti, G	1993	35	187	Mater Chem Phys	HCAPLUS
Alberti, G	1991		101	Mater Res Soc Symp P	HCAPLUS
Alberti, G	1992	17	245	React Polym	HCAPLUS
Alberti, G	1993	19	1	React Polym	HCAPLUS
Alberti, G	1996	17		Solid-state Supramol	
Alberti, G	1995	11	1	Supramol Chem	
Clearfield, A	1998	47	373	Progress in Inorgani	
Yamanaka, S	1979		1073	Chem Lett	HCAPLUS
Yamanaka, S	1994	69	152	Mater Sci Forum	

L142 ANSWER 14 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1998:480311 HCAPLUS

DN 129:210802  
 TI Synthesis and sulfonation of layered zirconium phosphate phenylphosphonate  
 AU Xiao, Jin-Bing; Xu, Jin-Suo; Tang, Yi; Gao, Zi  
 CS Department of Chemistry, Fudan University, Shanghai, 200433, Peop. Rep. China  
 SO Gaodeng Xuexiao Huaxue Xuebao (1998), 19(7), 1107-1111  
 CODEN: KTHPDM; ISSN: 0251-0790  
 PB Gaodeng Jiaoyu Chubanshe  
 DT Journal  
 LA Chinese  
 AB The main factors in the synthesis of layered zirconium phosphate phenylphosphonate  $Zr(PO_4H)_2 \cdot n(PO_3Ph)_n$  were investigated. At  $F-/Zr^{4+} = 12$  and  $H_3PO_4/Zr^{4+} = 20$ , homogeneous  $Zr(PO_4H)_2 \cdot n(PO_3Ph)_n$  ( $n = 0-2$ ) were synthesized by changing the amount of phenylphosphonic acid. The crystals are thermally stable  $<400^\circ$ . The Ph groups in the layered structure can be sulfonated almost quant. The sulfonated products  $Zr(PO_4H)_2 \cdot n(PO_3PhSO_3H)_n$  have abundant acidic sites and they are also stable  $<300^\circ$ .  
 IT **131249-73-5DP**, solid solution with zirconium phosphate  
 RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation) (preparation and surface properties of layered zirconium phosphate sulfonated phenylphosphonate)  
 RN 131249-73-5 HCAPLUS  
 CN Benzenesulfonic acid, phosphono-, zirconium(4+) salt (2:1) (9CI) (CA INDEX NAME)



D1-SO<sub>3</sub>H

D1-PO<sub>3</sub>H<sub>2</sub>

● 1/2 Zr(IV)

L142 ANSWER 15 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN  
 AN 1997:522220 HCAPLUS  
 DN 127:234294  
 TI Heterogeneous catalysis in carbonyl regeneration from 1,3-dithiolanes and 1,3-dithianes by zirconium sulfophenyl phosphonate  
 AU Curini, Massimo; Marcotullio, Maria Carla; Pisani, Emanuela; Rosati, Ornelio  
 CS Facolta Farmacia, Universita Perugia, Perugia, I-06123, Italy  
 SO Synlett (1997), (7), 769-770  
 CODEN: SYNLES; ISSN: 0936-5214  
 PB Thieme  
 DT Journal  
 LA English  
 OS CASREACT 127:234294  
 AB Layered Zr sulfophenyl phosphonate was found to be an efficient

heterogeneous catalyst for mild hydrolysis of 1,3-dithiolanes and -dithianes to the corresponding carbonyl compds.

IT **131249-73-5D**, solid solution with Me phosphate  
 RL: CAT (Catalyst use); USES (Uses)  
 (preparation of carbonyl compds. from dithiolanes and dithianes by zirconium sulfophenyl phosphonate catalysis)  
 RN 131249-73-5 HCAPLUS  
 CN Benzenesulfonic acid, phosphono-, zirconium(4+) salt (2:1) (9CI) (CA INDEX NAME)



D1-SO<sub>3</sub>H

D1-PO<sub>3</sub>H<sub>2</sub>

● 1/2 Zr(IV)

L142 ANSWER 16 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1997:231489 HCAPLUS

DN 126:307188

TI Preparation of layered zirconium phosphite sulfophenylphosphonates and their use as a catalyst

IN Cheng, Soofin; Shih, Ren-jai

PA National Science Council, Taiwan

SO U.S., 19 pp.

CODEN: USXXAM

DT **Patent**

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 5616749	A	19970401	US 1994-312884	19940927 <--
PRAI	US 1994-312884		19940927	<--	

AB The present invention provides zirconium phosphite sulfophenylphosphonates having the following formula  $Zr(HPO_3)_m(HPO_4)_n(PO_3C_6H_5)_y(PO_3C_6H_4SO_3H)_z$ , wherein  $m + n = x$ ;  $x + y + z = 2$ ;  $0.4 \leq x \leq 1.7$ ;  $0 \leq y \leq 1.6$ ; and  $0.01 \leq z \leq 0.8$ . The present invention also discloses a method of preparing these zirconium phosphite sulfophenylphosphonates and their use as a catalyst, e.g., in gas-phase synthesis of MTBE from methanol and isobutene.

IT **131249-73-5DP**, zirconium phosphite-phosphate-phenylphosphonate solid solns.

RL: CAT (Catalyst use); PNU (Preparation, unclassified); PREP (Preparation); USES (Uses)

(preparation of layered zirconium phosphite sulfophenylphosphonates and use as catalyst for MTBE synthesis)

RN 131249-73-5 HCAPLUS

CN Benzenesulfonic acid, phosphono-, zirconium(4+) salt (2:1) (9CI) (CA

INDEX NAME)



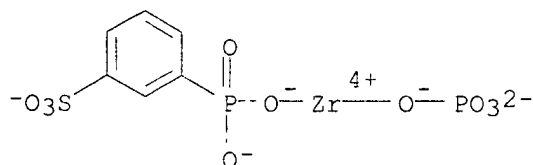
D1-SO<sub>3</sub>H

D1-PO<sub>3</sub>H<sub>2</sub>

● 1/2 Zr(IV)

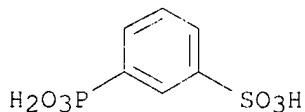
L142 ANSWER 17 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN  
 AN 1996:742373 HCAPLUS  
 DN 126:37731  
 TI Study on the catalyst structure of organic ultrafine particles  
 AU Liu, Cunye; Wang, Yao; Liu, Rongtai; Fu, Xiangkai  
 CS Dep. Phys., Southwest China Normal Univ., Chungking, 630715, Peop. Rep. China  
 SO Huaxue Wuli Xuebao (1996), 9(4), 367-372  
 CODEN: HWXUE4; ISSN: 1003-7713  
 PB Zhongguo Kexue Jishu Daxue Chubanshe  
 DT Journal  
 LA Chinese  
 AB Characterization of ultrafine particle (UFP) microstructure of zirconium phosphate sulfophenylphosphonate ( $\alpha$ -ZrPS), using anal. and conventional x-ray diffraction (XRD) technique, was conducted. It was found that  $\alpha$ -ZrPS as a kind of organic derivs. of zirconium phosphate ( $\alpha$ -ZrPS) possesses with layered structure to be similar to the microstructure of  $\alpha$ -ZrP. Furthermore, it belongs to the monoclinic crystal system. The average size of ultrafine particles of  $\alpha$ -ZrPS deduced from XRD line broadening (45.4 nm). Microstructure of UFP that is composed of stacks of the flat organic mols. has the highest surface catalytic activity and the character of a stable structure.  
 IT **116405-42-6**  
 RL: CAT (Catalyst use); PRP (Properties); USES (Uses)  
 (catalyst structure of zirconium phosphate sulfophenylphosphonate ultrafine particles)  
 RN 116405-42-6 HCAPLUS  
 CN Zirconate(2-), [phosphato(3-)- $\kappa$ O][3-(phosphono- $\kappa$ O)benzenesulfonato(3-)]-, dihydrogen (9CI) (CA INDEX NAME)





● 2 H<sup>+</sup>

L142 ANSWER 18 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN  
 AN 1996:274718 HCAPLUS  
 DN 125:32874  
 TI Heterogeneous catalysis in carbonyl regeneration from oximes, semicarbazones, and tosylhydrazones by zirconium sulfophenyl phosphonate  
 AU Curini, Massimo; Rosati, Ornelio; Pisani, Emanuela  
 CS Inst. di Chimica Organica, Univ. di Perugia, Perugia, I-06123, Italy  
 SO Synlett (1996), (4), 333-334  
 CODEN: SYNLES; ISSN: 0936-5214  
 PB Thieme  
 DT Journal  
 LA English  
 OS CASREACT 125:32874  
 AB Layered zirconium sulfophenyl phosphonate was an efficient heterogeneous catalyst for mild hydrolysis of oximes, semicarbazones, and tosylhydrazones to their corresponding carbonyl compds. Thus,  $\alpha$ -Zr(O3PMe)1.2(O3PC6H4SO3H-3)0.8 catalyzed hydrolysis of PhCH:NNHCONH2 in Me2CO-H2O gave 85% PhCHO.  
 IT **127833-97-ODP**, solid solution with zirconium methylphosphonate  
 RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation);  
 USES (Uses)  
 (heterogeneous catalysis in carbonyl regeneration from oximes, semicarbazones, and tosylhydrazones by zirconium sulfophenyl phosphonate)  
 RN 127833-97-0 HCAPLUS  
 CN Benzenesulfonic acid, 3-phosphono-, zirconium(4+) salt (2:1) (CA INDEX NAME)



● 1/2 Zr(IV)

L142 ANSWER 19 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN  
 AN 1996:192225 HCAPLUS  
 DN 124:263977  
 TI Preparation and catalytic reactions of zirconium sulfotolylphosphonate (ZSTP)  
 AU Luo, Bikui; Fu, Xiangkai

CS Dep. Chem., Southwest Teacher's Univ., Chungking, 630715, Peop. Rep. China  
 SO Lizi Jiaohuan Yu Xifu (1995), 11(2), 162-6  
 CODEN: LJYXE5; ISSN: 1001-5493  
 PB Nankai Daxue Gaofenzi Huaxue Yanjiuso  
 DT Journal  
 LA Chinese  
 AB Zirconium sulfotolylphosphonate (ZSTP) was prepared and characterized by X-ray diffraction pattern, TGA, IR and element anal. Esterification, acetal and ketal formation, etherification and preparation of alkene using ZSTP as solid acid catalyst were studied. The reactions in the presence of ZSTP as catalyst had high yields.  
 IT **175414-13-8P**  
 RL: CAT (Catalyst use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
 (preparation and catalytic reactions of zirconium sulfotolylphosphonate)  
 RN 175414-13-8 HCAPLUS  
 CN Zirconate(2-), [methylphosphonobenzenesulfonato(3-)][phosphato(3-)-O]-, dihydrogen, monohydrate (9CI) (CA INDEX NAME)

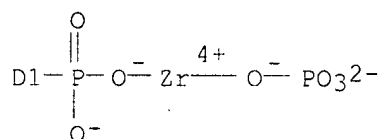
PAGE 1-A



D1-SO<sub>3</sub><sup>-</sup>

● 2 H<sup>+</sup>

D1-Me

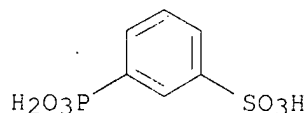


PAGE 2-A

● H<sub>2</sub>O

L142 ANSWER 20 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN  
 AN 1996:143276 HCAPLUS  
 DN 124:275270  
 TI Conductivity of Group IV metal sulfophosphonates and a new class of interstratified metal amine-sulfophosphonates  
 AU Stein, Sr., E. W.; Clearfield, A.; Subramanian, M. A.  
 CS Department of Chemistry, Texas A and M University, College Station, TX, 77843, USA  
 SO Solid State Ionics (1996), 83(1,2), 113-24  
 CODEN: SSIOD3; ISSN: 0167-2738  
 PB Elsevier

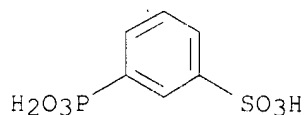
DT Journal  
 LA English  
 AB A series of zirconium and titanium phosphate sulfophenylphosphonates of the type  $M(HPO_4)_x(O_3PC_6H_4SO_3H)_{2-x}$  were prepared and characterized. They were found to exhibit proton conductivities which increased rapidly with increasing relative humidity (RH). At a RH of 85% and 25° conductivities of the order of  $2.1-13 \times 10^{-2} \Omega^{-1}cm^{-1}$  were observed. At constant RH, these compds. exhibit Arrhenius-type behavior up to at least 100°. A new class of compds. of the type  $[M(HPO_4)_x(O_3PC_6H_4SO_3H)_{2-x}][M'(HPO_4)_x(O_3P-R-NH_2)_{2-x}]$ ,  $M = Ti, Zr, Th$ , has been prepared by self-assembly methods. These compds. also exhibit proton conductivities that rapidly increase with the RH. Their conductivities are one to two orders of magnitude less than the pure sulfophosphonates but they are much more stable to swelling in aqueous media. Their strong dependence on RH recommends them for use as humidity sensors.  
 IT **141651-24-3 141651-24-3D**, solid solns. with zirconium(VI) and thorium(VI) phosphate and pyridinylethylphosphonate mixed salts **175694-12-9D**, solid solns. with titanium(VI), thorium(VI), and zirconium(VI) phosphate, benzenephosphonate, and pyridinylethylphosphonate mixed salts  
 RL: DEV (Device component use); PRP (Properties); USES (Uses)  
 (conductivity of Group IV metal sulfophosphonates and interstratified metal amine-sulfophosphonates)  
 RN 141651-24-3 HCAPLUS  
 CN Benzenesulfonic acid, 3-phosphono-, zirconium(4+) salt (2:1), hydrate (9CI) (CA INDEX NAME)



● x  $H_2O$

● 1/2 Zr(IV)

RN 141651-24-3 HCAPLUS  
 CN Benzenesulfonic acid, 3-phosphono-, zirconium(4+) salt (2:1), hydrate (9CI) (CA INDEX NAME)

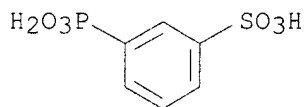


●x H<sub>2</sub>O

●1/2 Zr(IV)

RN 175694-12-9 HCAPLUS

CN Benzenesulfonic acid, 3-phosphono-, titanium(4+) salt (2:1), hydrate (9CI)  
(CA INDEX NAME)



●x H<sub>2</sub>O

●1/2 Ti(IV)

L142 ANSWER 21 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1995:819544 HCAPLUS

DN 123:258379

TI Oxidative polymerization of aniline in zirconium phosphate  
sulfophenylphosphonate

AU Chang, T. C.; Shen, W. Y.; Ho, S. Y.

CS Department of Applied Chemistry, Chung Cheng Institute of Technology,  
Taoyuan, 33509, Taiwan

SO Microporous Materials (1995), 4(5), 335-43

CODEN: MCMTEV; ISSN: 0927-6513

PB Elsevier

DT Journal

LA English

AB Zirconium phosphate and sulfophenylphosphonate (ZPS), an organo derivative of  $\alpha$ -zirconium phosphate ( $\alpha$ -ZrP), was used as template for aniline; the mol. complex can be polymerized to polyaniline (PAN). The structure of the ZPS-doped PAN (PAN-ZPS) is shown to have the typical spectral features of an emeraldine salt, as confirmed by UV-visible, IR, and ESR spectroscopies. The <sup>31</sup>P NMR (NMR) spectra and x-ray photoelectron spectroscopic (XPS) spectra of PAN-ZPS confirmed that the polyanilines were doped with ZPS. The thermal stability for ZPS-doped PAN is stable up to 250°; their conductivities dropped significantly at this temperature

IT 169063-42-7

RL: CAT (Catalyst use); MOA (Modifier or additive use); USES (Uses)  
(preparation and characterization of doped polyaniline prepared by template  
polymerization in zirconium phosphate sulfophenylphosphonate)

RN 169063-42-7 HCAPLUS

CN Benzenesulfonic acid, phosphono-, zirconium(4+) salt (9CI) (CA INDEX  
NAME)



D1-SO<sub>3</sub>H

D1-PO<sub>3</sub>H<sub>2</sub>

●<sub>x</sub> Zr(IV)

L142 ANSWER 22 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1995:701024 HCAPLUS

DN 123:245110

TI Synthesis and stability of mixed ligand zirconium phosphonate layered  
compounds

AU Clearfield, Abraham; Wang, J. Don; Tian, Ying; Stein, Eric; Bhardwaj,  
Chhaya

CS Dep. Chem., Texas A&M Univ., College Station, TX, 77843, USA

SO Journal of Solid State Chemistry (1995), 117(2), 275-89

CODEN: JSSCBI; ISSN: 0022-4596

PB Academic

DT Journal

LA English

AB The synthesis of layered phosphonates of Zr was carried out using ligands  
which were combinations of phenylphosphonic acid and either phosphoric or  
P acid. At high ratios of phosphate to phenylphosphonic acid in the  
presence of HF a staged or interstratified product was obtained in which  
layers of pure phosphate alternated with those of Ph pendant groups. At  
lower ratios of phosphate to phosphonate both ligands are randomly  
dispersed on the layers Zr(O<sub>3</sub>PPh)<sub>x</sub>(HPO<sub>4</sub>)<sub>2-x</sub>, where x = 0.7-1. When the  
2nd ligand was phosphite, a greater variety of products were obtained. In  
the case where both ligands were randomly dispersed on the layers, the  
interlayer distances ranged from 15.5 Å (almost all phenylphosphonate)  
to 10.4 Å (mostly phosphite). This latter spacing arises from each Ph  
group in one layer lying opposite a phosphite group in the adjacent  
layers. Interstratified phosphonate phosphites were also obtained. The  
behavior of these mixed derivs. on sulfonation using fuming H<sub>2</sub>SO<sub>4</sub> is also  
described.

IT 131249-73-5DP, zirconium phosphate solid solns.

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(preparation and interlayer structure of zirconium phenylphosphonate  
phosphates and phosphites and zirconium phosphonobenzenesulfonate  
phosphite)

RN 131249-73-5 HCAPLUS

CN Benzenesulfonic acid, phosphono-, zirconium(4+) salt (2:1) (9CI) (CA INDEX NAME)



D1-SO<sub>3</sub>H

D1-PO<sub>3</sub>H<sub>2</sub>

● 1/2 Zr(IV)

L142 ANSWER 23 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1995:547279 HCAPLUS

DN 123:66892

TI Molecular design of layered zirconium phosphonate catalysts

AU Segawa, K.; Kihara, N.; Yamamoto, H.; Nakata, S.

CS Department Chemistry, Sophia University, Tokyo, 102, Japan

SO Proc. Int. Zeolite Conf., 9th (1993), Meeting Date 1992, Volume 1, 255-62. Editor(s): Von Ballmoos, Ronald; Higgins, John B.; Treacy, Michael M. J. Publisher: Butterworth-Heinemann, Boston, Mass.

CODEN: 61EWAX

DT Conference

LA English

AB Preparation and characterization of two-dimensional zirconium phosphonate derivs. have been investigated. Two composite zirconium phosphonates in single crystal phase have also been investigated and characterized by XRD, <sup>13</sup>C-, and <sup>31</sup>P-MASNMR. These compds. are lamellar structures comprising zirconium phosphates or organophosphonates. Each layer consists of planes of zirconium bridged through phosphonate groups which alternate above and below the Zr atom planes, oriented away from the basal surfaces in a bilayered fashion in the interlayer region. The catalytic performance over zirconium phosphonates is evaluated by hydrolysis of Et acetate or by esterification of acetic acid. When the composite zirconium phosphonate is composed with an acidic function and with a hydrophobic function in single crystal phase, the catalytic activity showed a higher activity without swelling of the catalyst in the reaction media. The composite materials become accessible to any reactant mol. and improve hydrophobicity.

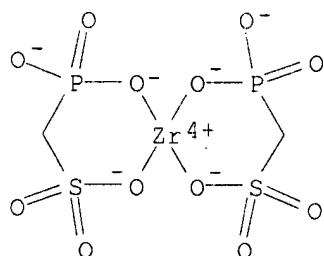
IT 137506-48-0P

RL: CAT (Catalyst use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(mol. design of layered zirconium phosphonate catalysts)

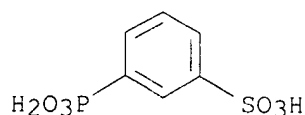
RN 137506-48-0 HCAPLUS

CN Zirconate(2-), bis[(phosphono-κO)methanesulfonato(3-)-κO]-, dihydrogen, (T-4)- (9CI) (CA INDEX NAME)



● 2 H<sup>+</sup>

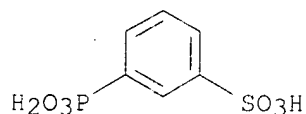
L142 ANSWER 24 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN  
 AN 1995:277998 HCAPLUS  
 DN 122:121692  
 TI Synthesis of novel metal phosphonate complex structures through soft chemistry  
 AU Stein, E.W.; Bhardwaj, C.; Ortiz-Avila, C.Y.; Clearfield, A.; Subramanian, M.A.  
 CS Department of Chemistry, Texas A&M University, College Station, TX, 77843, USA  
 SO Materials Science Forum (1994), 152-153(Soft Chemistry Routes to New Materials), 115-24  
 CODEN: MSFOEP; ISSN: 0255-5476  
 DT Journal  
 LA English  
 AB Layered compds. containing organic pendant groups with hydrophilic functional groups may be made to exfoliate in aqueous media. These compds. behave as ion exchangers and sequestrants. Preliminary data on Zr sulfo-phenylphosphonates and polyimine phosphonates will be presented. Mixing a polyimine with the sulfo-compound gave insol. interstratified complexes by self-assembly methods. Porous reactive complexes may be prepared in this way.  
 IT 141651-24-3 141651-24-3D, solid solution with zirconium phosphate  
 RL: PRP (Properties)  
 (elec. resistivity of)  
 RN 141651-24-3 HCAPLUS  
 CN Benzenesulfonic acid, 3-phosphono-, zirconium(4+) salt (2:1), hydrate (9CI) (CA INDEX NAME)



●x H<sub>2</sub>O

●1/2 Zr(IV)

RN 141651-24-3 HCAPLUS  
CN Benzenesulfonic acid, 3-phosphono-, zirconium(4+) salt (2:1), hydrate  
(9CI) (CA INDEX NAME)



●x H<sub>2</sub>O

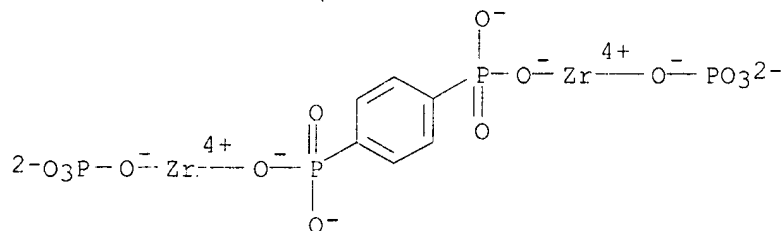
●1/2 Zr(IV)

L142 ANSWER 25 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN  
AN 1994:123296 HCAPLUS  
DN 120:123296  
TI Preparation and characterization of zirconium phosphate diphosphonates with the  $\gamma$ -structure: a new class of covalently pillared compounds  
AU **Alberti, Giulio**; Murcia-Mascaros, Sonia; Vivani, Riccardo  
CS Dip. Chim., Univ. Perugia, Perugia, 06123, Italy  
SO Materials Chemistry and Physics (1993), 35(3-4), 187-92  
CODEN: MCHPDR; ISSN: 0254-0584  
DT Journal  
LA English  
AB  $\text{ZrPO}_4(\text{H}_2\text{PO}_4)_{1-x}[\text{R}(\text{PO}_3\text{H})_2]_x/2.n\text{H}_2\text{O}$  were prepared by topotactic reaction between  $\gamma\text{-ZrPO}_4\text{H}_2\text{PO}_4 \cdot 2\text{H}_2\text{O}$  and solns. of diphosphonic acids in  $\text{H}_2\text{O}$ -acetone at 80°. In particular, 2 large batches of  $\gamma\text{-ZrPO}_4(\text{H}_2\text{PO}_4)_{0.56}[\text{C}_6\text{H}_4(\text{PO}_3\text{H})_2]_{0.22} \cdot 2.2\text{H}_2\text{O}$  and  $\gamma\text{-ZrPO}_4(\text{H}_2\text{PO}_4)_{0.18}[\text{C}_4\text{H}_8(\text{PO}_3\text{H})_2]_{0.41} \cdot 1.3\text{H}_2\text{O}$  were prepared and characterized. The x-ray powder diffraction patterns of the anhydrous and hydrated compds., the thermogravimetric curves and the  $\text{Na}^+$ -exchange capacity, as well a structural model of the covalently pillared Zr phosphate phenyldiphosphonate with the  $\gamma$ -structure, are reported and discussed.  
IT **149665-40-7D**, solid solution with zirconium hydrogen phosphate  
RL: RCT (Reactant); RACT (Reactant or reagent)



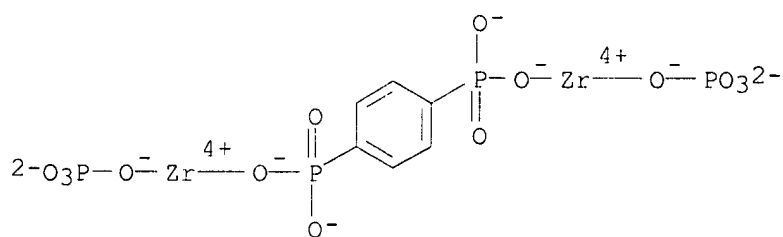
(XRD of)

RN 149665-40-7 HCAPLUS  
 CN Zirconate(2-), [ $\mu$ -[[1,4-phenylenebis[phosphonato- $\kappa$ O]](4-  
 )]]bis[phosphato(3-)- $\kappa$ O]di-, dihydrogen (9CI) (CA INDEX NAME)



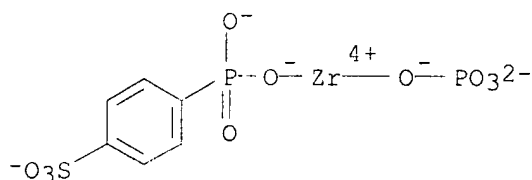
● 2 H<sup>+</sup>

L142 ANSWER 26 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN  
 AN 1993:526791 HCAPLUS  
 DN 119:126791  
 TI Inorganic ion exchange materials for nuclear waste effluent treatment  
 AU Clearfield, Abraham  
 CS Dep. Chem., Texas A and M Univ., College Station, TX, 77843, USA  
 SO Ind. Environ. Chem. [Proc. Tex. A&M Univ., IUCCP Annu. Symp.], 10th (1992), 289-99. Editor(s): Sawyer, Donald T.; Martell, Arthur Earl. Publisher: Plenum, New York, N. Y. CODEN: 58ZLA7  
 DT Conference  
 LA English  
 AB A series of Zr monophenyldiphosphonate phosphates, with the general formula  $\text{Zr}(\text{O}_3\text{PC}_6\text{H}_4\text{PO}_3)_x(\text{HPO}_4)_{2-2x}$  ( $x = 0.15-0.65$ ) was prepared. A series of compds. with di-Ph groups was also prepared, as well as Zr sulfophenylphosphonate phosphates. Thus, the authors demonstrated the synthesis of new materials with high selectivities for  $\text{Ca}^{2+}$  and  $\text{Sr}^{2+}$  and a low affinity for  $\text{Na}^{+}$ . In addition, sequestrants for both anions and cations present in nuclear waste solution were prepared. It is now necessary to demonstrate the utility of these materials in simulated nuclear waste solns.  
 IT 149665-40-7 149665-41-8  
 RL: PROC (Process)  
 (ion exchanger, for radioactive waste effluent treatment)  
 RN 149665-40-7 HCAPLUS  
 CN Zirconate(2-), [ $\mu$ -[[1,4-phenylenebis[phosphonato- $\kappa$ O]](4-  
 )]]bis[phosphato(3-)- $\kappa$ O]di-, dihydrogen (9CI) (CA INDEX NAME)



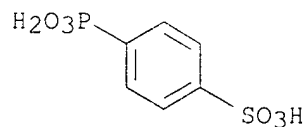
● 2 H<sup>+</sup>

RN 149665-41-8 HCAPLUS  
 CN Zirconate(2-), [phosphato(3-)-O][4-phosphonobenzenesulfonato(3-)-O4]-, dihydrogen (9CI) (CA INDEX NAME)



● 2 H<sup>+</sup>

IT **149350-19-6D**, solid solns. with zirconium monohydrogen phosphate  
 RL: PROC (Process)  
 (ion exchangers, distribution coeffs. for alkali metal and alkaline earth metal ions on)  
 RN 149350-19-6 HCAPLUS  
 CN Benzenesulfonic acid, 4-phosphono-, zirconium(4+) salt (2:1) (CA INDEX NAME)



● 1/2 Zr(IV)

L142 ANSWER 27 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN  
 AN 1993:430384 HCAPLUS  
 DN 119:30384  
 TI Preparation of trialkylacetic acids, particularly of pivalic acid, using solid acid catalysis

IN Sanderson, William A.; Richard, Michael A.  
 PA Catalytica, Inc., USA  
 SO PCT Int. Appl., 21 pp.  
 CODEN: PIXXD2

DT Patent  
 LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9218592	A1	19921029	WO 1992-US2897	19920409 <--
	W: JP				
	RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, MC, NL, SE				
	US 5241112	A	19930831	US 1991-682810	19910409 <--
	EP 580735	A1	19940202	EP 1992-910320	19920409 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, NL, SE				
	JP 06509555	T	19941027	JP 1992-509610	19920409 <--
PRAI	US 1991-682810	A	19910409	<--	
	WO 1992-US2897	W	19920409	<--	

OS MARPAT 119:30384

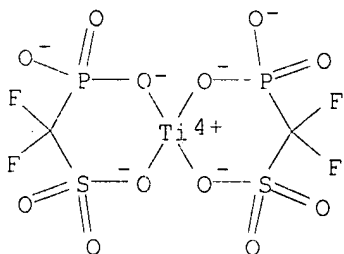
AB A solid acid catalyst containing sulfo and phosphonate groups, e.g., (HO3SCF2PO3)2Zr, is used, optionally with a Lewis acid such as BF3, for the preparation of a trialkylacetic acid from a branched olefin, CO, and H2O, especially for the preparation of Me3CCO2H from isobutene.

IT 148442-13-1

RL: CAT (Catalyst use); USES (Uses)  
 (catalysts, for carboxylation of isobutene to pivalic acid)

RN 148442-13-1 HCAPLUS

CN Titanate(2-), bis[difluorophosphonomethanesulfonato(3-)-OP,OS]-, dihydrogen, (T-4)- (9CI) (CA INDEX NAME)



● 2 H<sup>+</sup>

L142 ANSWER 28 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1993:137162 HCAPLUS

DN 118:137162

TI Protonic conductivity of layered zirconium phosphonates containing-SO3H groups. II. AC conductivity of zirconium alkyl-sulfophenyl phosphonates in the range 100-200°C, in the presence or absence of water vapor

AU Alberti, G.; Casciola, M.; Palombari, R.; Peraio, A.

CS Chem. Dep., Perugia, 06123, Italy

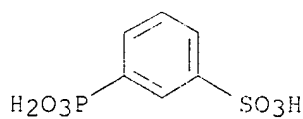
SO Solid State Ionics (1992), 58(3-4), 339-44

CODEN: SSIOD3; ISSN: 0167-2738

DT Journal

LA English

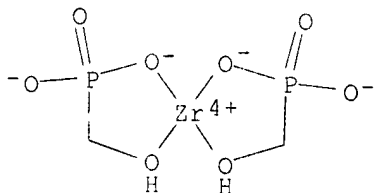
- AB Two Zr alkyl-sulfophenyl phosphonates with  $\alpha$ -layered structure were prepared and characterized by TG, x-ray diffraction, and impedance measurements. Their formulas are:  $\text{Zr}(\text{O}_3\text{PC}_6\text{H}_4\text{SO}_3\text{H})_{0.85}(\text{O}_3\text{PC}_2\text{H}_5)_{1.15} \cdot 3.7\text{H}_2\text{O}$ , with interlayer distance 18.5 Å, and  $\text{Zr}(\text{O}_3\text{PC}_6\text{H}_4\text{SO}_3\text{H})_{0.97}(\text{O}_3\text{PCH}_2\text{OH})_{1.03} \cdot 4.9\text{H}_2\text{O}$ , with interlayer distance 19.6 Å. In both cases the crystallization  $\text{H}_2\text{O}$  is completely lost at temps.  $<140^\circ$  and the decomposition of the organic moieties starts at  $>200^\circ$ . Reproducible conductivity values were found for anhydrous zirconium ethyl-sulfophenyl phosphonate in the range  $100\text{--}180^\circ$  ( $\sigma \approx 10\text{--}5 \text{ S cm}^{-1}$  at  $180^\circ$  in dry  $\text{N}_2$  with an activation energy of 15.2 kcal/mol). A continuous conductivity decrease was instead observed in this temperature range for Zr hydroxymethyl-sulfophenyl phosphonate. The conductivity of both compds. is greatly enhanced by the presence of  $\text{H}_2\text{O}$  vapor. Measurements were carried out at 100 and  $140^\circ$ ; the highest conductivity ( $\sigma \approx 10\text{--}2 \text{ S cm}^{-1}$ ) was found for Zr hydroxymethyl phosphonate at  $100^\circ$  and 60% relative humidity.
- IT **141651-24-3D**, solid solns. with zirconium ethylphosphonate hydrate and zirconium hydroxymethylphosphonate hydrate **146392-95-2D**, solid solution with zirconium sulfophenylphosphonate hydrate  
 RL: PRP (Properties)  
 (ionic conductivity of)
- RN 141651-24-3 HCAPLUS
- CN Benzenesulfonic acid, 3-phosphono-, zirconium(4+) salt (2:1), hydrate (9CI) (CA INDEX NAME)



● x  $\text{H}_2\text{O}$

● 1/2 Zr(IV)

- RN 146392-95-2 HCAPLUS
- CN Zirconium, bis[(hydroxymethyl)phosphonato(2-)]-, hydrate, (T-4)- (9CI)  
 (CA INDEX NAME)



● x  $\text{H}_2\text{O}$

L142 ANSWER 29 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1993:46541 HCAPLUS

DN 118:46541

TI Catalyst design of two-dimensional zirconium phosphonates

AU Segawa, Kohichi; Kihara, Nobuhiro; Yamamoto, Hiromichi

CS Fac. Sci. Technol., Sophia Univ., Tokyo, 102, Japan

SO Journal of Molecular Catalysis (1992), 74(1-3), 213-21

CODEN: JMCADS; ISSN: 0304-5102

DT Journal

LA English

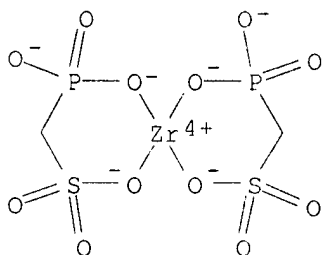
AB Zirconium phosphates or phosphonates, whose compds. have the general formula  $Zr(O_3PR)_2$ , can be obtained in crystalline forms with various layered structures. The preparation and characterization of two-dimensional zirconium phosphonate derivs. were investigated. Two composite zirconium phosphonates in a single-crystal phase were also investigated and characterized by x-ray diffraction and  $^{13}C$ - and  $^{31}P$ -magic-angle spinning NMR. These compds. are lamellar structures comprising zirconium phosphates or organophosphonates. Each layer consists of planes of zirconium bridged through phosphonate groups that alternate above and below the Zr atom planes, oriented away from the basal surfaces in a bilayered fashion in the interlayer region. The catalytic performance over zirconium phosphonates was evaluated by esterification of acetic acid. When the composite zirconium phosphonate includes an acidic function and a hydrophobic function in the single-crystal phase, the catalytic activity was higher than that of single-acidic-function zirconium phosphonate. The composite materials become accessible to any reactant mol., and their hydrophobicity improves.

IT 137506-48-0

RL: CAT (Catalyst use); USES (Uses)  
(catalysts, characterization of)

RN 137506-48-0 HCAPLUS

CN Zirconate(2-), bis[(phosphono- $\kappa O$ )methanesulfonato(3-)- $\kappa O$ ]-, dihydrogen, (T-4)- (9CI) (CA INDEX NAME)



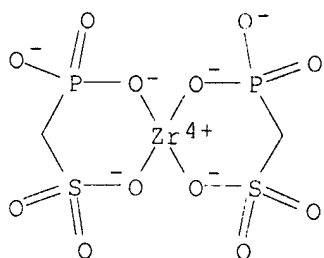
● 2 H<sup>+</sup>

IT 137506-48-0DP, solid solution with zirconium decanediylldiphosphonate

RL: CAT (Catalyst use); PREP (Preparation); USES (Uses)  
(catalysts, preparation and characterization of)

RN 137506-48-0 HCAPLUS

CN Zirconate(2-), bis[(phosphono- $\kappa O$ )methanesulfonato(3-)- $\kappa O$ ]-, dihydrogen, (T-4)- (9CI) (CA INDEX NAME)



● 2 H<sup>+</sup>

L142 ANSWER 30 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1992:267826 HCAPLUS

DN 116:267826

TI Protonic conductivity of layered zirconium phosphonates containing-SO<sub>3</sub>H groups. I. Preparation and characterization of a mixed zirconium phosphonate of composition Zr(O<sub>3</sub>PR)0.73(O<sub>3</sub>PR')1.27.nH<sub>2</sub>O, with R = C<sub>6</sub>H<sub>4</sub>SO<sub>3</sub>H and R' = CH<sub>2</sub>OH

AU **Alberti, G.; Casciola, M.; Costantino, U.; Peraio, A.; Montoneri, E.**

CS Dip. Chim., Univ. Perugia, Perugia, 06123, Italy

SO Solid State Ionics (1992), 50(3-4), 315-22

CODEN: SSIOD3; ISSN: 0167-2738

DT Journal

LA English

AB Zr(O<sub>3</sub>PC<sub>6</sub>H<sub>4</sub>SO<sub>3</sub>H)0.73(O<sub>3</sub>PCH<sub>2</sub>OH)1.27.nH<sub>2</sub>O was prepared and characterized by x-ray powder diffraction, TGA, electromotive force, and a.c. conductivity measurements. The compound seems to have a layer structure of α-type and the number of H<sub>2</sub>O mols. in the interlayer region strongly depends on relative humidity so that hydrated phases with different interlayer distances are formed. The electromotive force measurements showed the absence of electronic conduction.

Both the conductivity and the parameters of the Arrhenius equation are strongly influenced

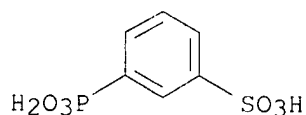
by the H<sub>2</sub>O content. At 20° and 90% relative humidity (n = 7.5), a conductivity of 1.6 + 10<sup>-2</sup> S cm<sup>-1</sup>, with an activation energy of 4.5 kcal/mol, was found. A correlation between changes in activation energy and interlayer distance was observed indicating the possible presence of a nonnegligible component of bulk transport.

IT **141651-24-3DP**, solid solution with sulfonylphenylphosphonate analog

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation) (preparation and elec. conductivity of)

RN 141651-24-3 HCAPLUS

CN Benzenesulfonic acid, 3-phosphono-, zirconium(4+) salt (2:1), hydrate (9CI) (CA INDEX NAME)



● x H<sub>2</sub>O

● 1/2 Zr(IV)

L142 ANSWER 31 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1991:664286 HCAPLUS

DN 115:264286

TI Molecular design of two-dimensional zirconium phosphonate catalysts

AU Segawa, K.; Sugiyama, A.; Kurusu, Y.

CS Fac. Sci. Technol., Sophia Univ., Tokyo, 102, Japan

SO Studies in Surface Science and Catalysis (1991), 60 (Chem.

Microporous Cryst.), 73-80

CODEN: SSCTDM; ISSN: 0167-2991

DT Journal

LA English

AB Preparation and characterization of 2-dimensional Zr phosphonate derivs. in either crystalline or amorphous forms were investigated. Two composite Zr phosphonates in the single-crystal phase were also investigated and characterized by x-ray diffraction <sup>13</sup>C- and <sup>31</sup>P-MASNMR. The catalytic performance over Zr phosphonates were evaluated by hydrolysis of ethylacetate in aqueous solution. When the composite Zr phosphonate is composed with an acidic function and with a hydrophobic function in the single-crystal phase, the catalytic activity in aqueous medium showed higher activity than that of single acidic Zr phosphonate. The composite materials become accessible to any reactant mol. and improve hydrophobicity.

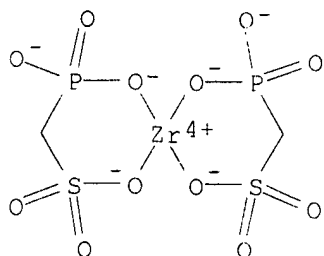
IT 137506-48-0

RL: CAT (Catalyst use); USES (Uses)

(catalysts, for hydrolysis of ethylacetate, characterization and thermal stability of)

RN 137506-48-0 HCAPLUS

CN Zirconate(2-), bis[(phosphono-κO)methanesulfonato(3-)-κO]-, dihydrogen, (T-4)- (9CI) (CA INDEX NAME)



● 2 H<sup>+</sup>

L142 ANSWER 32 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1991:151236 HCAPLUS

DN 114:151236

TI X-ray photoelectron spectroscopy and catalytic activity of alpha-zirconium phosphate and zirconium phosphate

AU Colon, J. L.; Thakur, D. S.; Yang, C. Y.; Clearfield, A.; Martin, C. R.

CS Dep. Chem., Texas A and M Univ., College Station, TX, USA

SO Report (1990), TR-45; Order No. AD-A217934, 35 pp. Avail.: NTIS

From: Gov. Rep. Announce. Index (U. S.) 1990, 90(12), Abstr. No. 029,953

DT Report

LA English

AB XPS analyses were performed on  $\alpha$ -Zr phosphate (ZrP) and on an organic derivative of ZrP, zirconium phosphate sulfophenylphosphonate (ZrPS). The XPS results show that the change of half of the phosphate groups in ZrP to sulfophenylphosphonate groups in ZrPS, changes the binding energy levels for some electrons in the solid. The XPS analyses also show that upon intercalation of ruthenium (2,2-bipyridine)<sub>3</sub><sup>2+</sup> into ZrPS, the binding energies of the R and N atoms of the metal complex are unperturbed relative to the free complex. ZrP samples show increased catalytic activity for dehydration of cyclohexanol with increased acidity of the sample. However, no correlation between Zr3d or O1s binding energies and catalytic activity was found.

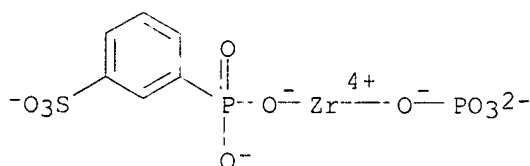
IT 116405-42-6

RL: CAT (Catalyst use); USES (Uses)

(catalysts from ruthenium bipyridine complex and, XPS study of)

RN 116405-42-6 HCAPLUS

CN Zirconate(2-), [phosphato(3-)- $\kappa$ O][3-(phosphono- $\kappa$ O)benzenesulfonato(3-)]-, dihydrogen (9CI) (CA INDEX NAME)



● 2 H<sup>+</sup>



L142 ANSWER 33 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN  
 AN 1991:82120 HCAPLUS  
 DN 114:82120  
 TI Preparation of zirconium (sulfo)arylphosphonates useful as acid catalysts  
 IN Sanderson, William A.; King, David L.  
 PA Catalytica Associates, Inc., USA  
 SO U.S., 5 pp.  
 CODEN: USXXAM  
 DT **Patent**  
 LA English  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 4942218	A	19900717	US 1988-197459	19880523 <--
PRAI	US 1988-197459		19880523	<--	

AB The polymeric title salts  $Zr(O_3PR)_n$  [ $n = 1-2.5$ ;  $R =$  (modified) hydrocarbyl containing  $\geq 1$  C:C unsatn., especially (substituted) Ph or naphthyl which may be sulfonated], useful as acid catalysts (no data), are prepared in a 3-step process involving (a) anhydrous dihalophosphination of RH with  $PX_3$  ( $X =$  halo) and a Zr compound, (b) oxidation, e.g. with  $ClSO_3H$ , and (c) hydrolysis. Using a solvent such as  $ClCH_2CH_2Cl$  can lead to dimeric products; sulfonation may also be performed following the 1st step. Thus, a mixture of  $ZnCl_4^{2-}$ , benzene 1 and  $PCl_3$  4.4 mol in 500 mL  $ClCH_2CH_2Cl$  was refluxed for 12 h (gas evolution), cooled to  $20^\circ$ , treated over 1 h with 4.4 mol  $ClSO_3H$  (vigorous gas evolution), refluxed for 1 h, and poured into ice- $H_2O$  to give after washing and drying 652 g product with theor. structure  $Zr(O_3PC_6H_4CH_2CH_2C_6H_4PO_3)0.25(O_3POH)1.5$ . The product was partially sulfonated (approx. 1/2 of benzene rings) by  $ClSO_3H$  in refluxing  $ClCH_2CH_2Cl$ , or completely sulfonated with  $SO_3$  (same conditions), to give  $Zr[O_3PC_6H_3(SO_3H)CH_2CH_2C_6H_3(SO_3H)PO_3]0.25(O_3POH)1.5$ .  
 IT **131249-73-5P**  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (preparation of, as acid catalyst)  
 RN 131249-73-5 HCAPLUS  
 CN Benzenesulfonic acid, phosphono-, zirconium(4+) salt (2:1) (9CI) (CA INDEX NAME)



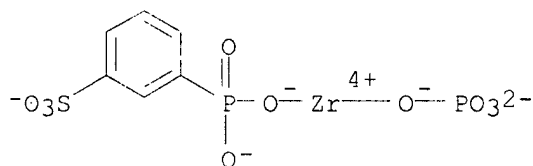
D1-SO<sub>3</sub>H

D1-PO<sub>3</sub>H<sub>2</sub>

● 1/2 Zr(IV)

L142 ANSWER 34 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN  
 AN 1990:542035 HCAPLUS  
 DN 113:142035

TI Photophysics and photochemistry of tris(2,2'-bipyridyl)ruthenium(II) within the layered inorganic solid zirconium phosphate sulfophenylphosphonate  
 AU Colon, J. L.; Yang, C. Y.; Clearfield, A.; Martin, C. R.  
 CS Dep. Chem., Texas A and M Univ., College Station, TX, USA  
 SO Report (1989), TR-39; Order No. AD-A214018, 40 pp. Avail.: NTIS  
 From: Gov. Rep. Announce. Index (U. S.) 1990, 90(5), Abstr. No. 009,217  
 DT Report  
 LA English  
 AB The photophysics and photochem. of tris(2,2-bipyridyl)ruthenium(II) (Ru(bpy)<sub>3</sub>) absorbed into the layered solid zirconium phosphate sulfophenylphosphonate (ZrPS) are described. The decay kinetics of the metal complex to depart from first-order behavior. Alberly's model of dispersed kinetics, which assumes a continuous distribution of rate consts., is used to explain the decay kinetics. The oxidative quencher methylviologen (MV) reacts with Ru(bpy)<sub>3</sub> in ZrPS via a combined dynamic and quasi static (sphere of action) quenching mechanism.  
 IT **116405-42-6**, Zirconium phosphate sulfophenylphosphonate  
 RL: USES (Uses)  
 (photochem. and photophysics of tris(bipyridine)ruthenium ion in layered solid)  
 RN 116405-42-6 HCAPLUS  
 CN Zirconate(2-), [phosphato(3-)-κO][3-(phosphono-κO)benzenesulfonato(3-)]-, dihydrogen (9CI) (CA INDEX NAME)

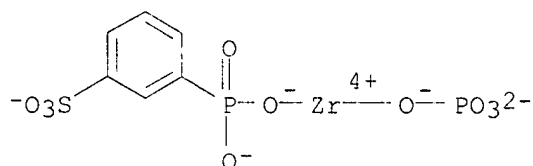


● 2 H<sup>+</sup>

L142 ANSWER 35 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN  
 AN 1990:539495 HCAPLUS  
 DN 113:139495  
 TI X-ray photoelectron spectroscopy and catalytic activity of α-zirconium phosphate and zirconium phosphate sulfophenylphosphonate  
 AU Colon, Jorge L.; Thakur, Deepak S.; Yang, Chao Yeuh; Clearfield, Abraham; Martin, Charles R.  
 CS Dep. Chem., Texas A and M Univ., College Station, TX, 77843, USA  
 SO Journal of Catalysis (1990), 124(1), 148-59  
 CODEN: JCTLA5; ISSN: 0021-9517  
 DT Journal  
 LA English  
 AB XPS anal. were performed on α-zirconium phosphate (ZrP) and on an organic derivative of ZrP, zirconium phosphate sulfophenylphosphonate, ZrPS.  
 The change of half the phosphate groups in ZrP to sulfophenylphosphonate groups in ZrPS changes the binding energy levels for some electrons in the solid. Upon intercalation of Ru(bpy)<sub>3</sub><sup>2+</sup> into ZrPS, the binding energies of the Ru and N atoms of the metal complex are unperturbed relative to the free complex. ZrP samples show increased catalytic activity for dehydration of cyclohexanol with increased acidity of the sample. No

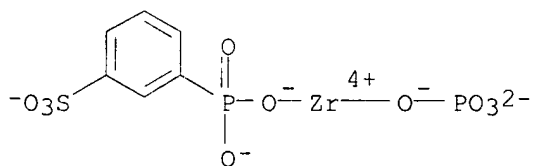
correlation between Zr 3d or O 1s binding energies and catalytic activity was found.

IT **116405-42-6**, Zirconium phosphate sulfophenylphosphonate  
 RL: CAT (Catalyst use); USES (Uses)  
 (catalysts, effect of intercalation of ruthenium bipyridine complex on, XPS study of)  
 RN 116405-42-6 HCAPLUS  
 CN Zirconate(2-), [phosphato(3-)-κO][3-(phosphono-κO)benzenesulfonato(3-)]-, dihydrogen (9CI) (CA INDEX NAME)



● 2 H<sup>+</sup>

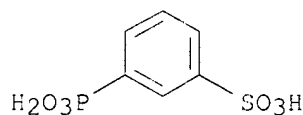
L142 ANSWER 36 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN  
 AN 1990:487428 HCAPLUS  
 DN 113:87428  
 TI Luminescence probe studies of ionically conductive membranes: zirconium phosphate sulfophenylphosphonate and Nafion  
 AU Colon, Jorge Luis  
 CS Texas A and M Univ., College Station, TX, USA  
 SO (1989) 185 pp. Avail.: Univ. Microfilms Int., Order No. DA9007463  
 From: Diss. Abstr. Int. B 1990, 50(10), 4491  
 DT Dissertation  
 LA English  
 AB Unavailable  
 IT **116405-42-6**, Zirconium phosphate sulfophenylphosphonate  
 RL: PRP (Properties)  
 (luminescence of)  
 RN 116405-42-6 HCAPLUS  
 CN Zirconate(2-), [phosphato(3-)-κO][3-(phosphono-κO)benzenesulfonato(3-)]-, dihydrogen (9CI) (CA INDEX NAME)



● 2 H<sup>+</sup>

L142 ANSWER 37 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN  
 AN 1990:241018 HCAPLUS

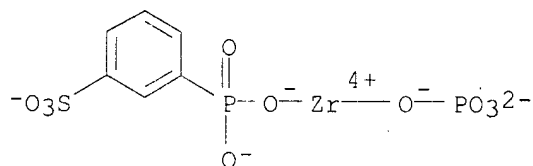
DN 112:241018  
 TI Thermodynamics of alkali and alkaline earth metal ion-exchange on zirconium sulfophosphonates  
 AU Kullberg, L. H.; Clearfield, A.  
 CS Dep. Chem. Phys., Winthrop Coll., Rock Hill, SC, 29733, USA  
 SO Solvent Extraction and Ion Exchange (1990), 8(1), 187-97  
 CODEN: SEIEDB; ISSN: 0736-6299  
 DT Journal  
 LA English  
 AB The thermodyn. of alkali and alkaline earth metal ion exchange on a layered Zr sulfophosphonate having the general composition  $Zr(O_3PC_6H_4SO_3H)_x(HPO_4)_{2-x} \cdot yH_2O$  were studied. Enthalpy and entropy changes accompanying the  $M^{2+}-H^+$  exchange ( $M = Na^+, Cs^+, Mg^{2+}, Ba^{2+}$ ) were determined by the temperature variation method. For the monovalent ions,  $Na^+$  and  $Cs^+$ , the enthalpy terms favor exchange whereas the entropy terms are unfavorable. In contrast, for the divalent ions,  $Mg^{2+}$  and  $Ba^{2+}$ , the exchange is due to highly favorable entropy terms.  
 IT 127833-97-0D, solid solns. with zirconium phosphate  
 RL: PRP (Properties)  
 (cation exchange on, of alkali and alkaline earth metal ions)  
 RN 127833-97-0 HCAPLUS  
 CN Benzenesulfonic acid, 3-phosphono-, zirconium(4+) salt (2:1) (CA INDEX NAME)



● 1/2 Zr(IV)

L142 ANSWER 38 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN  
 AN 1990:66408 HCAPLUS  
 DN 112:66408  
 TI Photophysics and photochemistry of tris(2,2'-bipyridyl)ruthenium(II) within the layered inorganic solid zirconium phosphate sulfophenylphosphonate  
 AU Colon, Jorge L.; Yang, Chao Yeuh; Clearfield, Abraham; Martin, Charles R.  
 CS Dep. Chem., Texas A and M Univ., College Station, TX, 77843, USA  
 SO Journal of Physical Chemistry (1990), 94(2), 874-82  
 CODEN: JPCHAX; ISSN: 0022-3654  
 DT Journal  
 LA English  
 AB The photophysics and photochem. of tris(2,2'-bipyridyl)ruthenium(II) ( $Ru(bpy)_3^{2+}$ ) adsorbed into the layered solid zirconium phosphate sulfophenylphosphonate are described. The decay kinetics of the metal complex are shown to depart from first-order behavior. Albery's model of dispersed kinetics, which assumes a continuous distribution of rate consts., is used to explain the decay kinetics.  
 IT 116405-42-6  
 RL: USES (Uses)  
 (photophysics and photochem. of tris(bipyridyl)ruthenium(II) absorbed into layered solid of, luminescence kinetics and quenching with methylviologen in)

RN 116405-42-6 HCAPLUS  
 CN Zirconate(2-), [phosphato(3-)-κO][3-(phosphono-  
 κO)benzenesulfonato(3-)]-, dihydrogen (9CI) (CA INDEX NAME)



● 2 H<sup>+</sup>

L142 ANSWER 39 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1988:559277 HCAPLUS

DN 109:159277

TI Optical investigations of the chemical microenvironment within the layered solid zirconium phosphate sulfophenylphosphonate

AU Colon, Jorge L.; Yang, Chao Yeuh; Clearfield, Abraham; Martin, Charles R.

CS Dep. Chem., Texas A and M Univ., College Station, TX, 77843, USA

SO Journal of Physical Chemistry (1988), 92(20), 5777-81

CODEN: JPCHAX; ISSN: 0022-3654

DT Journal

LA English

AB Y. and C. (1987) described a sulfonated derivative of the layered solid α-Zr(HPO<sub>4</sub>)<sub>2</sub>. This new layered solid ion exchanger Zr(HPO<sub>4</sub>)(O<sub>3</sub>PC<sub>6</sub>H<sub>4</sub>SO<sub>3</sub>H) (I) incorporates Ru(bpy)<sub>3</sub><sup>2+</sup> (bpy = 2,2'-bipyridine) via ion exchange. This optical probe ion was used to investigate the chemical microenvironment within I. Ru(bpy)<sub>3</sub><sup>2+</sup> showed pronounced spectral shifts in both its absorption and emission spectra (relative to H<sub>2</sub>O) when incorporated into I. Similar spectral shifts were observed for Ru(bpy)<sub>3</sub><sup>2+</sup> in other chemical microenvironments (e.g., micelles, clays, vesicles). These shifts were explained by invoking microenvironment-induced changes in the chemical, structural, and electrochem. characteristics of the complex itself. None of these explanations applied to I. The observed spectral shifts when Ru(bpy)<sub>3</sub><sup>2+</sup> was incorporated into I resulted from interactions of the complex with the Ph rings of the host and the bipyridyl rings of neighboring complexes.

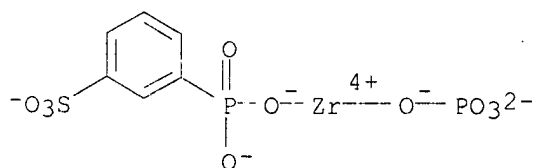
IT 116405-42-6

RL: PRP (Properties)

(optical studies of chemical microenvironment in layered solid of)

RN 116405-42-6 HCAPLUS

CN Zirconate(2-), [phosphato(3-)-κO][3-(phosphono-  
 κO)benzenesulfonato(3-)]-, dihydrogen (9CI) (CA INDEX NAME)



● 2 H<sup>+</sup>

L142 ANSWER 40 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1986:140950 HCAPLUS

DN 104:140950

OREF 104:22101a,22104a

TI Tin-119m Moessbauer spectroscopy and phosphorus-31 and tin-119 NMR of mixed aqueous 1-hydroxyethylidene-1,1-disodium phosphonate (EHDP) and tin(II) chloride solutions: evidence for EHDP-tin complexes

AU Alberola, N.

CS Dep. Radiol. Exp., Hop. Cardiol., Lyon, 69394, Fr.

SO Polyhedron (1985), 4(11), 1853-7

CODEN: PLYHDE; ISSN: 0277-5387

DT Journal

LA English

AB EHDP labeled with 99mTc is well suited for human-bone scintigraphy. Before adding TcO4-, the 1st step of the labeled-P procedure requires the preparation of a mixed aqueous EHDP and Sn(II) solution This mixture was studied in

both 119mSn Moessbauer spectroscopy and 31P and 119Sn NMR. 119mSn Moessbauer spectroscopy performed on mixed aqueous 0.1M EHDP and 0.01M SnCl2 solns. at pH 6 and immediately frozen at -196° after mixing showed the presence of an EHDP-Sn(II) complex. 31P NMR spectra of freshly prepared solns. showed the weighted average of the signals of the free EHDP ligand and of the EHDP-Sn(II) complex. When the EHDP concentration was 10 times as large

as the Sn(II) concentration, .apprx.90% of the EHDP was present as the free ligand and the average NMR signal deviated little from the signal of the free ligand. 119mSn Moessbauer spectroscopy and 31P NMR performed on these mixts. allowed to stand for 3 h at room temperature confirm the presence of a

structure in which Sn(IV) atoms are included, in agreement with 119Sn NMR results which show the presence of an (EHDP)2-Sn(IV) complex.

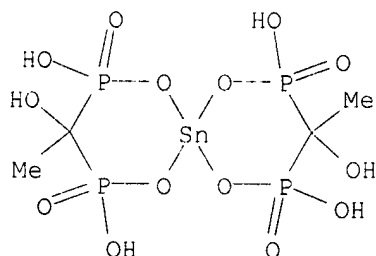
IT 96550-78-6

RL: RCT (Reactant); RACT (Reactant or reagent)

(tin-119 Moessbauer and phosphorus-31 and tin-119 NMR of)

RN 96550-78-6 HCAPLUS

CN 1,5,7,11-Tetraoxa-2,4,8,10-tetraphospha-6-stannaspiro[5.5]undecane-3,9-diol, 2,4,8,10-tetrahydroxy-3,9-dimethyl-, 2,4,8,10-tetraoxide (CA INDEX NAME)



L142 ANSWER 41 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1985:214103 HCAPLUS

DN 102:214103

OREF 102:33423a,33426a

TI Phosphorus-31, tin-119, and technetium-99 NMR spectrometry of a mixed aqueous solution of EHDP, tin, and technetium

AU Alberola, N.; Point, R.

CS Dep. Radiol. Exp., Hop. Cardiol., Lyon, 69394/3, Fr.

SO International Journal of Applied Radiation and Isotopes (1985), 36(2), 152-3

CODEN: IJARAY; ISSN: 0020-708X

DT Journal

LA French

AB <sup>31</sup>P and <sup>119</sup>Sn NMR spectroscopy performed on a mixed aqueous 0.1 M EHDP, 0.01 M <sup>119</sup>Sn-enriched Sn and 0.001 M <sup>99</sup>Tc solution gave evidence for a (EHDP)<sub>2</sub>-Sn(IV) complex. These spectroscopic analyses do not indicate <sup>99</sup>Tc presence in such a complex. <sup>99</sup>Tc NMR spectrum of this aqueous solution only shows free pertechnetate. However, <sup>99</sup>Tc NMR spectrum of this mixed aqueous solution requires an acquisition of 1 h vs. 20 s for the <sup>99</sup>Tc NMR reference signal

(with a same intensity). Consequently, .apprx.99% of the pertechnetate could be included in a complex which is not displayed by NMR spectroscopy.

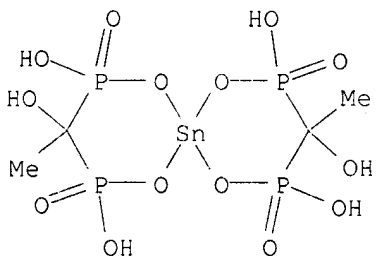
IT 96550-78-6P

RL: FORM (Formation, nonpreparative); PREP (Preparation)

(formation of, in presence of ammonium pertechnetate, NMR spectral study of)

RN 96550-78-6 HCAPLUS

CN 1,5,7,11-Tetraoxa-2,4,8,10-tetraphospha-6-stannaspiro[5.5]undecane-3,9-diol, 2,4,8,10-tetrahydroxy-3,9-dimethyl-, 2,4,8,10-tetraoxide (CA INDEX NAME)



L142 ANSWER 42 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1964:64563 HCAPLUS

DN 60:64563

OREF 60:11375d-e

TI Extraction of titanium with dioctyl methylenebisphosphonic acid and direct spectrophotometric determination of titanium in the organic phase

AU Gorican, Henrika; Grdenic, Drago

CS Rudjer Boskovic Inst., Zagreb, Yugoslavia

SO Anal. Chem. (1964), 36(2), 330-2

CODEN: ANCHAM; ISSN: 0003-2700

DT Journal

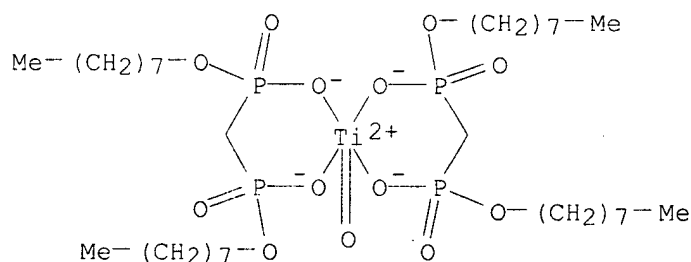
LA Unavailable

 AB Ti was determined as a peroxo(dioctyl methylenebisphosphonato)titanium complex in the concentration range 5-30  $\gamma$ /ml., with a maximum relative error of 2% in the presence of Th, Zr, Ce, Al, Cr, Mn, Co, and Ni. U(VI) and Mo(VI) must be absent. Ten ml. Ti-H<sub>2</sub>O<sub>2</sub> (9:1 by volume) was extracted with 10 ml. 0.025M dioctyl methylenebisphosphonic acid in kerosine, the organic layer centrifuged 5 min. after separation, and the absorbance measured at 420 m $\mu$ .

IT 106768-09-6, Hydrogen oxobis(dihydrogen methylenediphosphonato)titanate(IV), tetraoctyl ester (spectrum of)

RN 106768-09-6 HCAPLUS

CN Hydrogen oxobis(dihydrogen methylenediphosphonato)titanate(IV), tetraoctyl ester (7CI) (CA INDEX NAME)


 ● 2 H<sup>+</sup>

L142 ANSWER 43 OF 43 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1964:64562 HCAPLUS

DN 60:64562

OREF 60:11375c-d

TI X-ray spectral determination of small amounts of titanium in niobium pentoxide

AU Lavrent'ev, Yu. G.

SO Zavodskaya Laboratoriya (1964), 30(2), 168-9

CODEN: ZVDLAU; ISSN: 0321-4265

DT Journal

LA Unavailable

 AB Concns. of 0.03% Ti in Nb<sub>2</sub>O<sub>5</sub> were determined by an x-ray spectrometer with a quartz window, Cr-electroplated Cu anode, and an external standard. The anal. line TiK $\alpha$ 1 in the 2nd order reflection and a 0.3-0.4-mm. registration slit were used. The method is sensitive to Ti concns. of 0.01%, but can be improved to 0.005% if the TiK $\alpha$ 1,2 doublet is used with a 0.6-mm. slit and a filter that covers the K $\alpha$ 1 line. Reproducibility is 6-7% and 10-15 detns. can be made in 5 hrs.

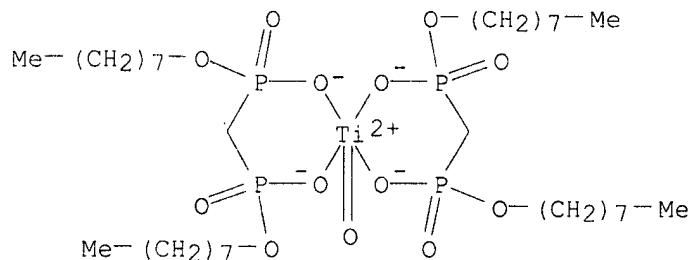
IT 106768-09-6, Hydrogen oxobis(dihydrogen methylenediphosphonato)titanate(IV), tetraoctyl ester



(spectrum of)

RN 106768-09-6 HCAPLUS

CN Hydrogen oxobis(dihydrogen methylenediphosphonato)titanate(IV), tetraoctyl ester (7CI) (CA INDEX NAME)



● 2 H<sup>+</sup>

=> d his

(FILE 'HOME' ENTERED AT 11:00:11 ON 17 JAN 2008)  
SET COST OFF

FILE 'HCAPLUS' ENTERED AT 11:00:19 ON 17 JAN 2008

L1 1 S US20050164092/PN OR (US2005-508748# OR IT2002-PG15)/AP, PRN  
E ALBERTI/AU  
L2 3 S E3  
E ALBERTI G/AU  
L3 301 S E3, E4, E15, E16, E20  
E CASCIOLA/AU  
L4 114 S E8, E9  
E PICA/AU  
E PICA M/AU  
L5 18 S E3, E8  
E FUMA/CO  
L6 15 S E4-E9  
L7 10 S E4-E9/PA, CS  
E FUMA/PA, CS  
L8 21 S E3-E26  
L9 1 S L1 AND L2-L8  
SEL RN

FILE 'REGISTRY' ENTERED AT 11:02:50 ON 17 JAN 2008

L10 22 S E1-E22  
L11 4 S L10 AND (ZR AND P)/ELS  
L12 3 S L11 NOT H3O4P  
L13 42510 S P/ELS AND (ZR OR TI OR SN OR CE)/ELS  
L14 93715 S P/ELS AND (HF OR SI OR PB OR GE)/ELS  
L15 127168 S L13, L14  
L16 STR

FILE 'HCAPLUS' ENTERED AT 11:38:32 ON 17 JAN 2008

FILE 'REGISTRY' ENTERED AT 11:39:35 ON 17 JAN 2008

jan delaval - 17 january 2008

L17 81522 S L15 NOT ((TIS OR AYS OR MXS OR MNS)/CI OR UNSPECIFIED OR SQL/  
 L18 76508 S L17 NOT (NCNC2-NCNC3 OR NCNC3)/ES  
 L19 50 S L16 SAM SUB=L18  
 L20 33533 S L18 AND CCS/CI  
 L21 STR L16  
 L22 50 S L21 SAM SUB=L15  
 L23 30304 S L21 FUL SUB=L15  
 SAV TEMP L23 BERN508A/A  
 L24 3 S L12 AND L23  
 L25 9152 S L23 AND 46.150.18/RID  
 L26 1531 S L25 AND L13  
 L27 179 S L26 AND S/ELS  
 L28 124 S L27 NOT N/ELS  
 L29 40 S L28 AND 1/NR  
 L30 38 S L29 NOT H3O4P  
 L31 35 S L30 AND 1/S  
 L32 25 S L31 NOT L14  
 L33 15 S L32 AND (C6H4O10P2SZR OR C7H6O10P2SZR OR C6H7O6PS OR C9H13O6P  
 L34 3 S L32 AND C8H11O6PS  
 L35 21151 S L23 NOT L24-L34  
 L36 3222 S L35 AND CCS/CI  
 L37 1293 S L36 AND 2/P  
 L38 1018 S L37 NOT W/ELS  
 L39 773 S L38 NOT N/ELS  
 L40 597 S L39 AND L13  
 L41 374 S L36 AND 4/P  
 L42 211 S L41 NOT (W OR N)/ELS  
 L43 179 S L42 AND L13  
 L44 122 S L43 AND (1/ZR OR 1/TI OR 1/SN OR 1/CE)  
 L45 57 S L43 NOT L44  
 L46 549 S L40 AND (1/ZR OR 1/TI OR 1/SN OR 1/CE)  
 L47 STR  
 L48 50 S L47 SAM SUB=L23  
 L49 2674 S L47 FUL SUB=L23  
 SAV TEMP L49 BERN508B/A  
 L50 2225 S L49 AND L13  
 L51 STR L47  
 L52 50 S L51 SAM SUB=L50  
 L53 2070 S L51 FUL SUB=L50  
 SAV TEMP L53 BERN508C/A  
 L54 STR L51  
 L55 10 S L54 SAM SUB=L53  
 L56 STR  
 L57 50 S L56 SAM SUB=L23  
 L58 3252 S L56 FUL SUB=L23  
 SAV TEMP L58 BERN508D/A  
 L59 2816 S L58 AND L13  
 L60 1393 S L59 NOT (W OR HF OR CO OR N OR SI OR PB OR GE)/ELS  
 L61 1341 S L60 NOT MO/ELS  
 L62 1177 S L61 AND (1/ZR OR 1/TI OR 1/SN OR 1/CE)  
 L63 286 S L62 AND 1/P  
 L64 588 S L62 AND 2/P  
 L65 37 S L62 AND 3/P  
 L66 117 S L62 AND 4/P  
 L67 1021 S L63-L66  
 L68 7 S L23 AND ZIRCONIUM 4  
 L69 2 S L68 AND (C4H9O5P OR C7H15O5P)  
 L70 0 S L23 AND C7H10O6P2  
 L71 6 S C7H10O6P2  
 L72 0 S L23 AND C7H11O12P3S

L73 9 S L23 AND C6H7O6PS  
 L74 0 S L23 AND C6H8O10P2S  
 L75 0 S L23 AND C6H6O7P2  
 L76 3 S C6H6O7P2  
 L77 0 S L23 AND C7H11O12P3S  
 L78 12 S L23 AND C6H4O10P2SZR  
 L79 0 S L23 AND C6H4O10P2STI  
 L80 0 S L23 AND C6H4O10P2SSN  
 L81 0 S L23 AND C6H4CEO10P2S  
 L82 2 S L23 AND C2H4O12P4ZR  
 L83 0 S L23 AND C2H4O12P4TI  
 L84 0 S L23 AND C2H4O12P4SN  
 L85 0 S L23 AND C2HCE4O12P4  
 L86 195 S L23 AND 833/RID  
 L87 2 S L23 AND (OPCPOZR-OPCPOZR)/ES  
 L88 19 S L23 AND (OPCPOSN-OPCPOSN)/ES  
 L89 1 S L88 AND C4H12O14P4SN  
 L90 1 S L23 AND 833.570/RID  
 L91 85 S L86 AND TI/ELS  
 L92 2 S L91 AND OPCPOTI-OPCPOTI/ES  
 L93 83 S L91 NOT L92  
 L94 2 S L93 AND OPCSOTI-OPCSOTI/ES  
 L95 14 S L86 AND SN/ELS  
 L96 28 S L24,L73,L78,L82,L87,L90,L92,L94  
 L97 STR  
 L98 2 S L97 SAM SUB=L20  
 L99 STR L97  
 L100 STR L99  
 L101 STR L100  
 L102 STR L99  
 L103 15 S L102 SAM SUB=L20  
 L104 412 S L102 FUL SUB=L20  
 L105 309 S L104 AND (1/ZR OR 1/TI OR 1/SN OR 1/CE)  
 L106 95 S L105 AND 2/NR  
 L107 87 S L106 NOT N/ELS  
 L108 28 S L107 NOT OPOPOTI-OPOPOTI/ES  
 L109 21 S L108 NOT OPOPOSN-OPOPOSN/ES  
 L110 8 S L109 NOT OPOPOZR-OPOPOZR/ES  
 L111 30 S L96,L110  
 L112 0 S L105 AND 2/NR NOT L106  
 L113 205 S L67 AND 46.150.18/RID  
 L114 46 S L113 AND 1/NR  
 L115 42 S L114 NOT L111  
 L116 4 S L115 AND (C7H6O10P2SZR OR C6H4O10P3ZR)  
 L117 34 S L111,L116  
 L118 1583 S L23 AND 46.150.18/RID AND 1/NR  
 L119 395 S L118 AND L13  
 L120 375 S L119 AND (1/ZR OR 1/TI OR 1/SN OR 1/CE)  
 L121 232 S L120 NOT N/ELS  
 L122 177 S L121 NOT L114,L117  
 L123 20 S L122 AND IDS/CI  
 L125 3 S L\*\*\* AND L23

FILE 'HCAPLUS' ENTERED AT 13:55:52 ON 17 JAN 2008

L126 54 S L117  
 L127 36 S L126 AND PY<=2002 NOT P/DT  
 L128 6 S L126 AND (PD<=20020522 OR PRD<=20020522 OR AD<=20020522) AND  
 L129 42 S L127,L128  
 L130 10 S L126 AND L1-L9  
 L131 8 S L130 AND L129

L132 2 S L130 NOT L131  
SEL RN L130

FILE 'REGISTRY' ENTERED AT 13:57:42 ON 17 JAN 2008

L133 61 S E23-E83  
L134 23 S L133 AND L15  
L135 20 S L134 NOT H3O4P  
L136 17 S L135 NOT (H4O7P2 OR C2H7O3P OR CH5O4P)

FILE 'HCAPLUS' ENTERED AT 13:59:53 ON 17 JAN 2008

L137 39 S L136  
L138 26 S L137 AND PY<=2002 NOT P/DT  
L139 5 S L137 AND (PD<=20020522 OR PRD<=20020522 OR AD<=20020522) AND  
L140 31 S L138,L139  
L141 9 S L140 AND L1-L9  
L142 43 S L129,L131,L140,L141

FILE 'REGISTRY' ENTERED AT 14:00:53 ON 17 JAN 2008

FILE 'HCAPLUS' ENTERED AT 14:01:05 ON 17 JAN 2008

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